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SCOPE AND METHODS OF THE STATISTICAL REPORTING SERVICE

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SCOPE AND METHODS OF THE STATISTICAL REPORTING SERVICE

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Foreword

The intervening decade since Scope and Methods of the Statistical Reporting Service was last published has been one of the most volatile in the agricultural history of this Nation: Surplus gave way to encouraged production; an energy shortage pressured farmers to stretch their already considerable conservation skills; a strongly market-oriented agriculture brought greater sensitivity to the decisionmaking situations facing the farmer-businessman; fluctuating price patterns and steadily rising production costs heightened the need for greater efficiency.

Periods of such crisis and strain increase demands for reliable data that can be woven into the analytical and managerial processes of all levels of the economy—personal, regional, national, and international. One of the greatest contributions toward stability is the provision of truth and facts that alleviate uncertainty. Modern agriculture requires detailed and precise counts and measurements of production, supply, and prices.

This publication presents the organization and statistical procedures used by the Statistical Reporting Service in providing current primary agricultural data for various groups, including farmers and others in the agricultural industry, commerce, government, education, and economic analysis and policymaking staffs of the Department of Agriculture and other Federal and State agencies.

The extensive descriptions of the methods we employ in making estimates and forecasts are expected to serve different roles for the readers, such as aids for training and teaching activities, and for determining how well the data prepared and published by this Agency meet the data users' needs. However, the primary purpose of Scope and Methods of the Statistical Reporting Service is to fully detail and explain the origin of the agricultural data that affect the Nation.

Harry C. Trelogan

HARRY C. TRELOGAN
Administrator
Statistical Reporting Service

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Chapter 1

AN OVERVIEW

INTRODUCTION

Farming has changed from a way of life to a way of making a living. An agricultural producer today is a combination of highly skilled technician and executive who frequently needs to apply more expertise and make more demanding decisions than a manager of a factory or other business.

To operate efficiently, effectively, and profitably, farmers, ranchers, and others in agriculture require accurate information and reliable evaluations concerning production, supplies, marketings, prices, exports, weather, and the vast array of other inputs that make agriculture America's biggest business.

The Statistical Reporting Service (SRS) provides the channel for the orderly flow of this intelligence about the agricultural economy of the country. This agency, the primary fact-collecting and fact-reporting organization of the U.S. Department of Agriculture, is responsible for the national and State crop and livestock estimates and related statistical data, and the coordination and improvement of the USDA's statistical program.

One of the principal purposes of SRS is to present a picture of the current and near-future supplies of agricultural products. For crops, the annual cycle of reports begins with farmers' intentions to plant, followed by forecasts of planted acreages, acreages intended for harvest, probable yields, and potential production. Estimates of acreages harvested, actual yields, and production are made at the end of the season. Subsequently, reports on utilization, disposition, and value are issued.

Livestock inventory numbers are published annually or semiannually. Seasonal details on hog production, cattle on feed, and production of eggs, milk, and meat are issued during the year in monthly and quarterly reports. Reports on breeding intentions, farrowings, hatchings, chick placements, and calf and lamb crops provide indications of prospective market supplies. Estimates of manufactured dairy products and cold storage holdings of agricultural commodities are also published on a regular basis.

Numerous associated statistical series are also reported: fertilizer, number and size of farms, farm labor and wages, prices received and paid by farmers, grain stocks, honey, mink, mushrooms, naval stores, and weekly weather and crop bulletins.

USEFULNESS OF STATISTICS

The uses of statistical information are extensive and varied. A main user is the producer, although the impact of crop and livestock data on a given producer depends on the type and size of his operation.

To cash-crop farmers, with more alternatives in planning crop acreage than those producing feed crops for use on the farm, early-season indications of acreage planted nationally and regionally are quite useful. Producers of crops that can be stored are confronted with finding the best market opportunity, and information on production and stocks is valuable. Producers of perishable crops are interested in the timing of plantings and the acreages planted, as an indication of market flow during the marketing period.

Livestock producers and feeders, including poultrymen, in planning their operations utilize inventory numbers by species, type, and weight group, together with breeding intentions, slaughter, price, and crop production information for decisions involving purchases, sales, and capital investments.

Other important users of agricultural statistics are farm organizations, agribusiness, State and national farm policymakers, and foreign buyers of agricultural products. Use of data by farm groups ranges from simple distribution indications to preparing an important marketing campaign. Farm supply firms also rely heavily on statistics when planning purchases and sales of feed, fertilizer, machinery, fuel, seed, and other farm production items. For those engaged in marketing, processing, and distributing agricultural products, supply and demand information is useful in linking producer and consumer.

Government agencies at various levels are important users of statistics. Federal farm programs, in all their different forms, require information on acreages, production potential, stocks, prices, and income. Agricultural statistics are used in planning and administering other related Federal and State programs in such activities as consumer protection, conservation, recreation, foreign trade, and education.

Although perhaps not separate and distinct from the categories of those already mentioned, the role of the analyst as a user of statistics should be recognized. The analyst in Government, universities, agribusiness, and farm organizations transforms statistics into projections of current trends, interprets their economic implications, and evaluates alternative courses of action in terms of prospective outcomes. Their projections, in turn, affect producers.

Those in agriculture, those associated with agriculture, and those relying on agriculture's food and fiber output benefit from crop and livestock statistics, because such data help develop a stable atmosphere for production, marketing and distribution operations.

Modern agriculture increasingly calls upon SRS to supply more frequent, timely, and detailed information in its commodity estimating program. These demands have prompted work on not only regular crop and livestock statistics, but also farm production expenditures, farm labor, potential value of satellite imagery to acreage estimates, and photography in fruit and nut forecasts.

THE SRS STRUCTURE

The Statistical Reporting Service, under various organizational titles, has served agriculture for well over a century. The tasks and procedures have changed continually during that span to accommodate the needs and alterations of the industry. Later chapters will discuss in detail the operations and methodology of today's agricultural statistics program.

SRS is a broad-based, nonpolicymaking organization headquartered in Washington, D.C., with State Statistical Offices serving all States. Responsibilities for a viable program, directed by the Administrator, are shared by the Research, Survey, and Estimates Divisions, the Crop Reporting Board, and the State Statistical Offices (SSO's).

A Program Planning Committee, generally meeting three or four times a year, evaluates the Service's activities and develops both short-term and long-range plans to improve the overall operation of SRS. The Deputy Administrator is the Chairman of the Committee, with the Assistant Administrator, Division Directors, and the SRS Program Planning Officer as permanent members. Representatives from the State Statistical Offices rotate membership.

Main responsibilities of SRS center on collecting, preparing, and publishing regular series of crop and livestock estimates and data on related elements of farming. SRS is also concerned with statistical research and improved methods of gathering, evaluating, and processing information.

The Service frequently performs technical assignments for other Federal or State offices in addition to limited services for agriculturally related private industry on a reimbursable or advance-payment basis. These services comprise primarily surveys and related statistical data collection activities. SRS also participates in the Agency for International Development's foreign-visitor training program, and provides technical consultation and support in developing countries for agricultural estimating programs.

Research Division

The primary functions of the Research Divi-

sion are to develop new and improved collecting, estimating, and forecasting methods for agricultural statistics and to encourage the use of sound statistical techniques throughout USDA. The Division devises improved sampling techniques and methods of controlling sampling errors, constructs area and list sampling frames, and researches nonsampling errors stemming from questionnaire wording, enumerators' interviews, or other causes. New models for assessing the yield of field and fruit crops and the application of remote sensing in identifying crops, land use, and acreage measurements are investigated. The Division publishes the results of its research.

The Statistical Clearance Office, part of the Research Division, is responsible for the review of all statistical forms, survey plans, and record-keeping requirements originating in the Department that require approval by the Office of Management and Budget. This is done to assure that information needed by the Federal Government from business enterprises and the public is obtained with a minimum burden on respondents, at minimum cost to the Government, and without unnecessary duplication. The Clearance Office maintains liaison with the Office of Management and Budget for the Department on matters of statistical standards and clearance, and also maintains liaison with other Government agencies on statistical activities.

Survey Division

The Survey Division is responsible for preparing and establishing procedures used by the SSO's in collecting data by mail and enumerative surveys, and for the objective yield measurement program. The Division designs and tests survey techniques, including forms and questionnaires, writes data collection instructions, and conducts training schools for enumerators.

Much survey information is processed by the Division through the USDA's computer capabilities, with the summaries produced being used by State Statistical Offices and the Crop Reporting Board in setting official estimates.

Specialists work to improve methods of survey operations, automatic data processing, transmission, storage, and retrieval systems, and related operations.

The Division also conducts data collection activities for other USDA and Federal or State agencies on a reimbursable basis.

Estimates Division

The Estimates Division is the primary source in SRS for agricultural statistics, including their analysis and interpretation, for use by the Crop Reporting Board in making estimates and forecasts of the Nation's agriculture. The Division evaluates commodity statistics, determines needs, and implements proper statistical plans in support of the crop and livestock reporting program, and ensures that appropriate methods and procedures are used in all phases of the program.

Much of this publication ("Scope and Methods") concerns the day-to-day work of the Estimates Division.

Crop Reporting Board

The Crop Reporting Board reviews and adopts official State and national estimates for crops and livestock as required by USDA regulations (see Appendix). The Board includes a Chairman, the SRS Deputy Administrator; a Vice Chairman, the Estimates Division Director; a Secretary, and the Chief, Data Services Branch, Survey Division.

In addition to these permanent members, five or six commodity specialists are selected by the Chairman from the Estimates Division and the State Statistical Offices to participate in estimate determinations. The purpose of the Board is to review and adopt crop and livestock estimates.

State Statistical Offices

The State Statistical Offices are the primary data collecting, processing, evaluating, estimating, and publishing units of SRS. Following prescribed procedures, they conduct surveys and recommend statistical estimates for their States and counties to the Crop Reporting Board. These estimates, after Board review and adoption, become part of the national, State, and county data series.

This decentralized approach for making estimates is based on the assumption that statisticians located in the SSO's can best adapt general procedures to the varied local circumstances and have a far better grasp of regional conditions affecting agriculture.

Other major responsibilities of the SSO's include liaison with the State's agricultural sector and maintenance of a corps of voluntary reporters for surveys and a part-time staff of enumerators.

There are 44 State Statistical Offices; the Massachusetts office serves the six New England States, and the Maryland office serves Delaware.

FEDERAL-STATE COOPERATION

Federal appropriations for the crop and livestock estimating program provide national and State estimates for important commodities. Other sources of financing are required for collecting current data in smaller geographical subdivisions or for minor commodities, and for other details not provided for in direct appropriations.

State governments frequently exhibit an interest in acquiring data in more detail than that provided by Federal programs. Since 1917, SRS has pursued a policy of working jointly with the State agencies interested in obtaining better agricultural statistics. At present there are cooperative agreements in effect with 48 States through the State Departments of Agriculture, universities, or some other State agency, for the collection and publication of these data. Under these agreements the Federal program of statistics is supplemented to fit State needs. State resources are utilized to provide more complete detail on certain commodities, information for commodities of local importance, county estimates, and related activities not supported by Federal funds.

By working together, SRS and the State agencies mutually benefit from economies of unification, from less imposition on producers and other respondents in acquiring data, and from maintaining consistency between the estimates derived by different public agencies.

PREPARING A REPORT

In December each year, the date and hour of the release of each SRS-Washington, D.C., report for the coming year is announced. With few exceptions, reports are issued by a designated release officer at the specified time. The State Statistical Offices make the national and State information available immediately after the Washington release.

Obviously, work for each report begins well before the issuing date with survey preparations, approval and printing of questionnaires, issuance of instructions, establishment of training schools for enumerators, and the myriad other procedures needed to make a national program function effectively and efficiently.

The major sources of reliable information for crop and livestock estimates are directly associated with agriculture—producers, hatcherymen, feeders, slaughterhouse managers, meat and poultry inspectors, grain elevator operators—the same people who are extensive users of SRS data.

Information is collected by various methods: Mail surveys, telephone, personal interview, and through observation in selected fields. Individual reports from respondents are held confidential by the agency and are used only to develop the estimates. Information for estimates represents the combined efforts of both State Statistical Offices and Washington, D.C., personnel.

When making a survey it is rarely possible, or even necessary, to get data from everyone concerned. What the total group is like can be inferred or estimated from a small portion of the group called the sample.

Mail surveys based either on nonprobability or probability samples are widely used to provide statisticians with general information on an array of agricultural activities. Mail surveys with nonprobability samples are quick and economical but cannot, alone, provide all the information needed for accurate estimates. For example, not all farmers in the sample respond to the questionnaire; and those who may not be representative of the full group because of differences between their farms and others not in the sample.

To overcome the weakness in this type of mail survey, SRS has increased its use of probability sampling techniques. Statistical theory provides a basis for selecting samples so that the chance, or probability, of each farm or farmer being in the sample can be computed. This offers two advantages: First, if data are collected from all farms in a probability sample that represents a true cross section of U.S. farms, the estimates are not biased as they may be when the sample is not representative; second, a probability sample provides information for computing sampling errors. Thus estimates can be made with a known degree of precision. Survey methodology is discussed in later chapters.

In the State Statistical Offices, data from the surveys are edited, summarized, and analyzed, and then expanded into State indications. State statisticians prepare initial forecasts or estimates and transmit them for review, with appropriate supporting material and comments, to the Crop Reporting Board.

Statistics prepared by SRS are based on sample surveys rather than on census counts (complete enumerations). While crops are still growing and before harvest, expected yield and production data are called "forecasts." After harvest is complete and end-of-season surveys have been made, these crop statistics are called "estimates."

Estimates of production of corn, wheat, cotton, soybeans, and sweet oranges, and the supply of grain in storage are defined as "speculative." These commodities are heavily traded on commodity markets and anyone having early access to official estimates would have an obvious advantage in trading. Precautions are taken to prevent unauthorized access to such information before its official release. Reports from surveys on the speculative commodities from the major producing States go through the mails in distinctive envelopes and receive special handling. When they arrive at USDA in Washington, they are placed in a special steel box secured by two locks. One key is held by the Office of the Secretary of Agriculture and the other by the Secretary of the Crop Reporting Board.

Early on the morning of crop report day, the Chairman and a representative of the Secretary, escorted by a USDA guard, open the box, remove the reports, and take them to the Board rooms.

While the reports are being prepared, the area is isolated and guarded. Doors are locked, the window blinds closed and sealed, and all telephones disconnected. Food is sent in. Only authorized persons may enter, and no one leaves until the report is released.

Commodity indications from the State Statistical Offices are reviewed by the specialists in the Estimates Division and those serving on the Crop Reporting Board to arrive at official State estimates and a national total.

While certain reports are designated "nonspeculative"—livestock and poultry numbers, vegetables, potatoes, agricultural prices, cold storage holdings, and others—strict security precautions are still imposed. Although not prepared behind locked doors, material for these reports is worked on in restricted areas and access by unauthorized persons is denied. These estimates, too, are reviewed by the Crop Reporting Board before release.

The law specifies statutory penalties that can be imposed upon SRS employees for disclosing any data or crop information prior to official release, or personally engaging in trading on the commodity markets. The penalty can be a $10,000 fine and 10 years in prison. Issuing false information may bring a $5,000 fine and 5 years in prison.

Shortly before the lockup report is to be released, the Secretary of Agriculture or his representative enters the Board room for his first look at the commodity estimates, and receives a briefing on the report, which has been printed inside the lockup. He then signs the report.

Minutes prior to release time, the Chairman, Secretary, and a limited number of Board members take copies of the report to the newsroom outside the locked area. No communication with anyone is permitted. Reporters from wire services, newspapers, radio, television, and brokerage houses wait behind a restraining line for copies of the report. The reports are made available to all at the same time.

State and national estimates go immediately by telephone, computer, or facsimile to the State Statistical Offices where information is provided to local news media and full reports are sent to farmers who request them. ■

Chapter 2

SAMPLING METHODOLOGY AND ESTIMATION

INTRODUCTION

Although the Statistical Reporting Service conducts some of its surveys by virtually complete enumeration of certain parts of the population, most are based on samples drawn from the population. With the use of modern techniques, sampling is not only less costly in time and money than a census, but also can produce more reliable results.

The Service uses a great variety of sampling techniques to produce current agricultural statistics about crops, livestock, prices, and other information relating to the agricultural economy. Significant advances in methods used have been made in recent years, particularly with the emphasis on probability sampling technology, although nonprobability sampling retains an important place in the work of the Statistical Reporting Service.

This chapter provides a description of the common sampling procedures (frame construction, sample selection, analysis, and estimation) currently used and describes some of the research activities under way to improve the quality of agricultural statistics.

THE SAMPLING FRAME AND SAMPLE SELECTION

A basic consideration in any sample survey is the sampling frame, which is an aggregate of units or elements from which a sample can be selected. From data collected in the sample, inferences may be made about all the elements in the frame. These elements collectively form the survey population, which may or may not be the same as the target population, which is the total universe of elements about which information is desired. From SRS surveys, estimates must be made for the target population.

The type and quality of sampling frames have much influence in determining sample design and overall survey methods. The frames used by SRS are of two basic types—the list frame and the area frame.

List Frame Sampling

Sampling from list frames has for many years played a prominent role in the collection of data for agricultural statistics. A list frame is a list of elements presumably all from the population about which inferences are to be made, along with appropriate identifying data. Lists of farm operators, including names and addresses, are used for many of the surveys conducted by SRS and are well suited for the collection of information by mail. The low cost of data collection from a list sample is one of the principal advantages of this method. Another advantage is the ease with which supplementary information for classifying the units can be included as part of the frame. This allows the use of efficient stratified sample designs.

The main disadvantage of the list frame is the inability to compile "complete" lists; that is, lists that represent all of the current units, such as farms, livestockmen, or processors—such units are continually changing. For example, a list of farm operators soon becomes outdated because new operators enter the activity, others leave the farm, some expand operations or lease land to others, or there are other changes within the operations themselves.

Since probability sampling requires that all units of the population be represented, list sampling had few applications for probability surveys until relatively recent developments permitted selection from two or more frames that cover the population. Applications of such multiple-frame sampling are discussed later in this chapter.

Prior to the application of probability sampling by SRS during the early 1960's, nonprobability mail surveys were the principal means of collecting data for current agricultural statistics. This method is still used as an important data collection technique for many commodities, but usually requires supplemental survey information.

In using nonprobability mail samples, the shortcomings must be recognized. First, lists of potential respondents are not complete frames and, while still useful, some lists tend to be selective as well. Second, there is no assurance that respondents who voluntarily complete and return a questionnaire are typical or representative of those who fail to do so. The second limitation can be overcome with followup interviews of at least a sample of nonrespondents. However, this is usually not practical, considering the limitations imposed by the frame, and nullifies the principal advantage of nonprobability mail surveys—low cost.

Despite the biases inherent in mail samples, surveys of this type with sufficient response provide consistent indications from survey to survey. Appropriate methods of estimation are used to remove biases from the estimates insofar as possible.

Area Frame Sampling

In 1954, SRS began investigating the use of area frame sampling. A program was developed and expanded to include the 48 conterminous States by 1967 in a system of surveys for obtaining information on crops, livestock, and other agricultural items. Today area frame sampling is an integral part of the SRS estimating program.

In area frame sampling the frame consists of an aggregation of identifiable units of land (segments) which may be sampled. For SRS purposes, characteristics concerned with agriculture must then be associated with these sample segments. There are three different concepts that are useful in associating agricultural activities with the area frame. These are the closed segment, the open segment, and the weighted segment.

The closed segment associates the agriculture with the segment itself; it includes all that is inside the segment boundaries and excludes all that is not. In the open segment, all activities of farms with headquarters located inside the segment boundaries are associated with the segment regardless of whether the activity itself is inside or outside the segment boundaries. In the weighted segment, all agriculture associated with a farm, any part of which lies within the segment, is attributed to the segment in proportion to the fraction of the farm acreage that is inside the segment.

For characteristics such as crop acreages which are directly associated with land, the closed segment has proved to be clearly superior in sampling efficiency. But data concerning the economics of the farming enterprise, for example, can be more easily associated with the farm headquarters and do not lend themselves to the closed segment. The weighted segment is used to gain efficiency by reducing variability caused by specialized and widely differing sizes of farms.

A unique attribute of the area frame is that it is a complete sampling frame. All desired agricultural activities are represented when every unit of land area has been given some positive probability of being selected during the sampling process. Furthermore, it does not suffer the same kind of deterioration through time as does a list frame.

The area frame lends itself well to enumerative general-purpose surveys. It is not suited to mail surveys, since names and address of persons living or operating within the segment boundaries are generally not known in advance. The area frame is not efficient for special-purpose surveys or surveys of highly specialized farming activities, because the lack of supplementary information precludes the segregation of farming enterprises of a particular class.

Two basic types of area frames are in use by SRS for general-purpose surveys. The first is the frame developed for the Master Sample of Agriculture, which was constructed in the early 1940's at Iowa State University with the cooperation of USDA and the Bureau of the Census. The Master Sample was designed for sampling characteristics associated with farms. The frame consists of

county maps upon which minor civil divisions and frame units containing a specified number of sampling units have been delineated. Each sampling unit contained about four farms. SRS experience suggested that segments half the size of those of the Master Sample were more efficient for general-purpose surveys, and these units are being used. Crop reporting districts are used to impose geographic stratification on the frame. Typically, States contain about nine crop reporting districts. Within these districts the agriculture is fairly homogeneous. Allocation of segments to crop reporting districts is about proportional to the square root of value of products sold.

The Master Sample frame was available for use from the beginning of SRS area frame sampling. However, it was soon apparent from pilot work in the Mountain States that stratification of land according to use was essential. Consequently, the second type of area frame used by SRS is the land use frame, in which all land prior to sampling is first classified according to use. The stratification is based on extent and type of farming and can be described in four broad categories: (1) Intensively cultivated areas where a significant portion of the land is under cultivation, (2) extensive agricultural areas used primarily for grazing and producing livestock, (3) highly developed land found in cities and industrial areas, and (4) nonagricultural land, such as parks and other recreational areas. In addition to land use stratification, geographic stratification is frequently used to separate differing agricultural areas.

Segments are of a predetermined size, with segment counts associated with each area delineated on maps according to size of area. Segments typically are about 1 square mile in intensively cultivated areas, several square miles and larger in the more open farming areas, and about one-tenth square mile in city and residential areas. The number of segments sampled from each stratum is determined by reviewing optimum allocations for major commodities and choosing a compromise for general-purpose sampling.

Land use frames are currently being developed State by State as needs indicate and as time and resources permit. States still using the Master Sample frame are in the north central, south central, and south Atlantic regions, where differences of land use practices are less apparent.

Segment selection has generally followed a systematic-sample approach where the frame listing is arrayed geographically. Recently, interpenetrating sample designs have been used. Interpenetrating designs utilize several smaller independent samples, and have more sample flexibility and advantages in computing sample variation. They also fit well with a sample rotation scheme. Typically, 20 percent of the SRS segments are rotated annually to relieve respondent burden.

All selected segments are visited annually about June 1 for the June enumerative survey to ascertain planted crop acreages and inventories of hogs and cattle, and to classify operations for purposes of subsampling for subsequent surveys. All separate land operating arrangements are delineated within the segments and are referred to as "tracts." To control sampling errors, the area sample is supplemented with a small list frame sample of known large livestock operations, this being a limited form of multiple-frame sampling.

Sampling for several subsequent area frame surveys uses the June information for classifying tracts. The classifications made are utilized as strata for second-stage sampling. Tracts are then subsampled from each stratum at varying rates, according to their information potential. The December enumerative survey is the largest survey of this type and focuses on fall-seeded crops and livestock inventories. A large portion of the tracts with wheat and livestock in June are selected. Nonagricultural tracts are sampled very lightly.

Multiple-Frame Sampling

A method rapidly gaining importance and use in SRS surveys is multiple-frame sampling. As the name implies, this technique includes the use of more than one sampling frame. For SRS needs, this means a list frame and an area frame.

Theory for multiple-frame sampling was developed only as recently as the early 1960's. Research under the leadership of Dr. H. O. Hartley[1] was supported by SRS at Iowa State University. Concepts of multiple-frame sampling are basically those of probability sampling concerning repre-

[1] Dr. Hartley is currently Director, Institute of Statistics, Texas A&M University.

sentation, known probabilities, and randomness of selection. In addition, two criteria need to be considered: (1) Every element of the population must belong to at least one of the sampling frames, and (2) it must be possible to identify for each selected unit to which frames, if any, it belongs other than the one from which it was selected. The use of a complete area frame satisfies the first consideration. The second is more difficult operationally, requiring the proper classification of each tract operator as to whether he is also included in the list frame.

Multiple-frame sampling has some distinct advantages for SRS, particularly for items such as livestock, specialized crops, and economic data. These items are poorly correlated with land alone and are inefficiently estimated by the area frame. In multiple-frame sampling, most of the data for the population of interest can be collected more efficiently through the list frame. Some of the data can be collected by mail. Also, it is usually possible to develop and incorporate in the list frame some index of size for units that is used in stratification. The area frame measures list incompleteness. In this way, the two frames complement each other.

The State Statistical Offices have principal responsibilities for developing list sampling frames of farmers and ranchers for multiple-frame surveys. A variety of list sources is used, including State farm census, assessor's records, Agricultural Stabilization and Conservation Service (ASCS) lists, brand lists, and lists maintained by State governments for inspection or control purposes. More specialized lists are often combined with a basic list to improve list coverage. Lists vary greatly in quality and usefulness and require considerable effort to prepare before use in sampling.

Often the list has to be converted into computer-readable form. Units which are duplicated must be removed and the indexes of size of operation may have to be obtained from other sources. Special large mail surveys are sometimes conducted for the sole purpose of classifying farms by type and size. County and local officials of ASCS, the Extension Service, and other USDA agencies have provided valuable assistance in list development efforts.

After initial list development, maintenance and updating are continual tasks. Without such efforts, lists deteriorate rapidly and soon lose their advantage in sampling efficiency.

ESTIMATION METHODS

After a survey is designed, the sample selected, and data collected, the data must be edited for consistency and then summarized. From these survey results the statistician must prepare the estimates. The computations and procedures for translating survey data into estimates involve technical considerations. Usually more than one method is available, but the choices are largely specified by survey design and there are distinct differences between deriving estimates from nonprobability surveys and from surveys which follow the concepts of probability theory.

Nonprobability Surveys

In developing current estimates from nonprobability mail surveys, estimating procedures must recognize potential biases in the survey results. The procedures used generally depend on past relationships of survey data to final estimates. It is assumed that these same relationships are continuing, but periodic checks must be made to verify this assumption and to true up the estimates. Check data are obtained from a variety of sources, but generally are in the form of records of marketings or census enumerations. Information from the U.S. census of agriculture and from annual farm censuses conducted in some States has commonly been used for this purpose.

Many factors affect the reliability of estimates derived from nonprobability surveys. First, it is necessary to evaluate the accuracy of the check data used to establish true values. Errors in these data will result in errors in the relationships derived for past years. There is always the possibility of error in assuming that past relationships of survey data to final estimates will continue. Comparability of survey data must be maintained for the period in which relationships are derived. If survey indications for past surveys are based on selective data, indications used to make the current estimate must be subject to the same kind of selectivity for best results. Therefore, consideration of comparability should be given to the list samples, the sampling procedure and distribution, and the survey response.

Survey indications

Direct-expansion indications are not possible with nonprobability surveys because of the inability to associate known probabilities with the data collected. Therefore, most survey indications are relationships estimated from the survey data which can be applied to some assumed known base. A brief description of some of the commonly used nonprobability survey indications follow.

Ratio to land: Relations of an item to total land in farms can be estimated from survey data. Used primarily for crops, the sample total acreage for a specified crop is divided by the sample total farmland acreage. This provides a measure of the proportion of farmland acreages used for individual crops. The relations of any two items on the questionnaire can be estimated in this manner.

Ratio to base: This indication is similar to the above but the control variable, such as capacity of feedlots or grain storages, is known in advance and is part of the sampling frame. The ratio estimated from the sample totals can be expanded by the known base totals for the population.

Average per farm: Averages per farm estimated from survey data are used to estimate livestock. These averages can be associated with estimates of farm numbers. Averages obtained from mail surveys can be quite biased because of widely varied farm sizes, which may not be properly represented among survey respondents.

Matched reports: Estimates of survey-to-survey changes can be made by matching "identical farm" reports from two successive surveys. This indication has commonly been called the "current/current" ratio. Indications are developed by applying survey changes to the previous estimates. Care must be taken in the matching process to assure that the reporting units are comparable between surveys. The procedure does not permit new operating units to be included in the tabulations.

A variation of this procedure is the "current/historical" indication, which also measures change from some previous period, but data for the prior period is collected on the current questionnaire. For example, a farmer would be asked to report his previous year's acreage of each crop along with current year's acreage. The advantage is that all reports can be used for tabulation and no matching is required, but it has been found that the data reported by farmers for the preceding year are often subject to error because of memory bias or other reasons.

Yield indications: Mail surveys have retained much of their usefulness for estimating and forecasting crop yields. Perhaps one reason is that yields do not vary greatly by size of farm. At harvest, actual yields can be derived by obtaining harvested acreage and comparable production data. Indications for forecasting yields are based on reports of condition or probable yield. Reported condition consists of evaluations by growers and crop reporters of the size of the current crop expressed as a percentage of a hypothetical full or normal crop. Expected or probable yield is likewise a subjective judgment of crop prospects, but is expressed directly as yield per acre.

Data interpretation

The assumptions that must be made to prepare estimates from nonprobability survey indications are factors that limit survey reliability. Several methods most frequently used for minimizing or interpreting the inherent biases should be mentioned.

Weighted averages: A procedure for minimizing response biases is to use geographic or size group stratification in summarizing the data. Known or estimated weights are used to weight stratum averages up to State estimates. The effect of a poor distribution in sample response is minimized, providing respondents have characteristics similar to others in the same stratum. For example, crop yields would normally be expected to be more alike within a crop reporting district than within an entire State. Average yields from the survey are computed at the level of the crop reporting district and weighted to a State average yield, using district estimates of crop acreages for weights. Size group stratification is used similarly.

Charts: Most nonprobability survey data are interpreted in some way through charts which pictorially describe past relations of survey data to final estimates. The most common of these is the simple regression chart, where the relations are plotted, using the horizontal axis for locating the magnitude of past survey indications and the vertical axis for corresponding estimates. The statistician prepares the estimate by determining the best-fit location on the graph corresponding

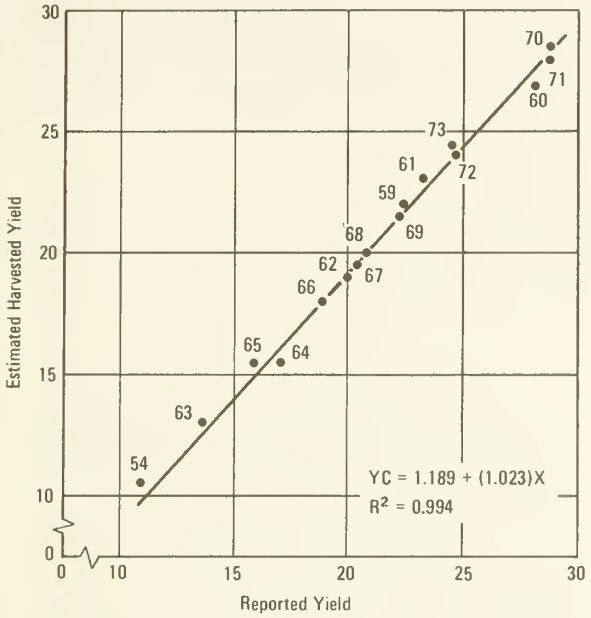


Figure 1.—Example of a regression chart used to estimate a State's winter wheat yield.

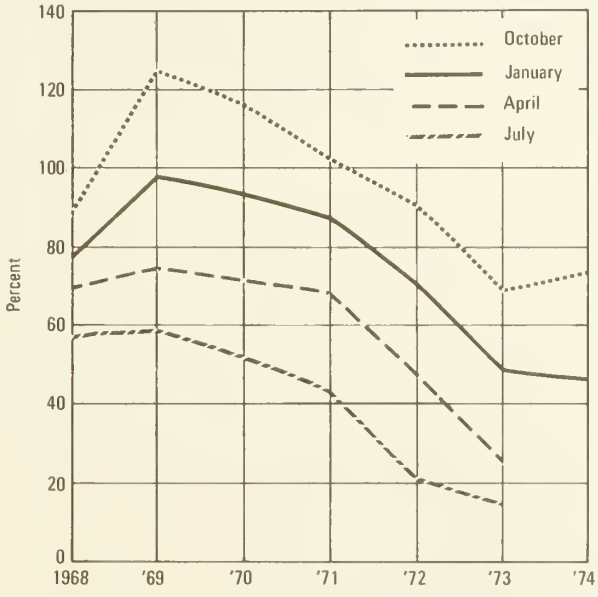


Figure 2.—Example of a time-series chart used in estimating a State's stocks of wheat on farms.

to the current survey indication. The graph interpretation is frequently done visually, although the linear regression line is usually computed and plotted to assist interpretation. Points on the graph are identified by year so that recent year relations can be given more influence if desired.

Time-series charts are used for some commodities. The horizontal axis is used for the sequential plotting of time, and the levels of indications and estimates are indicated on the vertical axis. Indications and the corresponding estimates are distinguished by different types of lines drawn to show respective year-to-year changes. Current estimates are set with the available knowledge of these past relations between the level of estimates and survey indications.

Trend is an important consideration for some estimates, particularly in developing crop yield forecasts. A time-series chart in addition to a regression chart is sometimes used for this purpose. The regression chart is used to present the usual survey-estimate relationship. Deviations from the regression line are plotted on the time-series chart. These deviations plotted sequentially illustrate the effect of time and allow a projection to be made. Another method uses time as a second variable for developing a multiple-regression indication. In this way an allowance for trend is incorporated into the indication. Additional variables, such as precipitation, are occasionally used in developing the multiple-regression indication.

Probability Surveys

Estimates can be made from probability surveys without dependence on prior survey relations or benchmark data. With known probabilities, raw data are expanded into unbiased estimates of current agricultural activities. Also, sampling errors are computed that provide the statistician with a tool for evaluating the reliability of estimates generated. Sampling errors not only provide measures of precision, but the sources of sample variation are useful in optimizing sample designs and allocations. The quality of statistics derived from probability survey data usually justifies their higher costs.

Basic considerations for survey reliability are sampling frame, survey design, and sample size. Each is important in maintaining sampling errors at acceptable levels, although constraints on sam-

ple size are frequently imposed by budget limitations. Measures of nonsampling errors are rarely available. Much effort is made to minimize potential nonsampling errors through survey training programs, questionnaire design and testing, providing precise survey procedures, and utilizing comprehensive editing systems.

Enumerative survey

In SRS "enumerative survey" refers to area frame sample surveys in which data are collected by personal interview. The basic estimator used for area frame survey data is the unbiased direct expansion. Raw survey data from each segment are expanded by the reciprocal of the probability of selection. Estimates are generally computed at the stratum level for analysis purposes, but inferences from enumerative survey data are seldom made below the State level, because of relatively large sampling errors. Segments are the primary sampling units, hence tract data must be summed to the segment level. Sampling errors are then determined from the variation between segments.

Ratios and ratio estimators are also utilized with data from area frame surveys. These estimates are particularly helpful in evaluating changes from survey to survey. For the June enumerative survey, ratios are computed by comparing current survey data with previous-year data for identical segments. Ratios are computed at each level of summary, hence biases inherent in ratio estimates are minimized. In expanding previous and current matched data, consideration is given to the fraction of total sampling units that are comparable. If 80 percent of the segments in a stratum are identical (following a 20-percent annual rotation scheme), all expanded matched data would be divided by an additional factor of 0.8. This allows for variations in the rotation scheme. The ratio estimate is derived by applying the ratio to the direct expansion estimate from the previous year's survey. Estimated sampling errors take into account the correlation or covariance of the matched data.

A third estimator is derived from a ratio to land area. This estimator is efficient for major crops and other items that are highly correlated with land area. The actual area of each segment is measured from a scaled aerial photograph. The relation of each item to the measured area is calculated and this ratio is applied to the total base land area at the State level. All concepts of ratios and ratio estimates apply; however, the base or total land area is assumed to be known without error.

Somewhat more difficult are the theoretical concepts associated with subsequent area frame surveys in which all June tracts are first classified into strata and then subsampled. Although it is a two-stage sample design, the second stage of sampling is not confined to primary sampling units, as it is in cluster sampling. Instead, the second stage of selection is among all tracts classified according to predetermined criteria using the June information. With this sampling scheme it is quite likely that some segments will have no tracts selected in the sample. Unbiased direct-expansion estimates can still be generated by associating the probabilities of selection (probabilities at the first stage of selection multiplied by probabilities at the second stage) with the data for each tract sampled. The difficulty arises in computing sampling errors. The concept assumes a product estimator where the factors are a population estimate for total number of tracts within each classification and an estimated average tract value for tracts within each classification. The variance component associated with estimating the number of tracts is computed from the June enumerative survey, whereas the component for between-tract variation must come from current survey data.

Ratio estimators are also used for surveys based on subsamples of June area tracts. The ratios are computed by relating current data to June data. The June enumerative survey direct-expansion estimate becomes the base for computing a ratio estimate. These estimates are particularly useful for the July acreage update survey where correlations are very high between actual planted acreages and those reported during the June enumerative survey (which in some cases are intended plantings).

Multiple-frame survey

The general estimation model for multiple-frame surveys based on a list and area sampling frame is:

$$X = X_a + pX_{al} + qX'_{al}$$

where X_a = the estimated total for the portion of the population included only in the area frame;

X_{al} = the estimated total for the population included in both frames, computed from the area sample;

X'_{al} = the estimated total for the population included in both frames, computed from the list sample;

and $p + q = 1$

Since X_{al} and X'_{al} are two independent estimates of the same population (overlap domain), any values for the weights p and q which sum to 1 will provide unbiased estimates. Optimum weights will be inversely proportional to the variances associated with each estimate. In practice, weights are predetermined, utilizing information from prior surveys. The value of q is usually large and is associated with the greater efficiency of the list frame. For livestock surveys, values of $p = 0$ and $q = 1$ are used. This equation is often referred to as a "screening" estimator. In the variance computation, X_a and X_{al} are considered nonindependent components of the estimating equation.

Little use has been made of ratios and ratio estimates in multiple-frame sampling. Direct-expansion estimates have proven to be efficient and allow complete flexibility in developing the sampling plan for each survey.

Objective yield survey

Objective yield surveys provide crop yield information for estimates or forecasts based directly on counts, measurements, and weights of the crop made from small plots in a probability selection of sample fields. When a crop is mature and ready for harvest, yield can be estimated by harvesting and weighing production from these plots of known size and expanding to a yield per acre. This method of preharvest sampling to estimate yields is often referred to as "crop cutting." Similar procedures are used for tree crops, but yield is computed in terms of production per tree and observations are usually made on sampled limbs. For a mature crop, estimating yield becomes primarily a sampling problem. Theoretically, samples can be designed to produce estimates of yield with any desired degree of precision.

The same sampling considerations are important for objective surveys used in forecasting yields. In addition, early-season plant characteristics must be identified which can be used to predict yield at maturity. A forecast model (often a regression equation) has to be developed that describes the relations between the prediction variables and the final outcomes. For all crops, it is usually helpful to analyze yield in terms of two components: Number of fruits and weight per fruit. Reliable forecasts of number of mature fruits are readily possible, since most plants set fruit at a fairly early stage of maturity. Identifying useful plant characteristics and predicting weight per fruit is more difficult, since growth of the fruit typically continues until maturity.

An additional factor of yield which must be taken into account for SRS estimates is harvesting loss. Biological (gross) yields can be estimated from preharvest objective sampling but these estimates overstate the production that is actually hauled from fields and can enter marketing channels. To estimate net yield, special post-harvest surveys are conducted to measure all production remaining in fields after harvest. These losses, which are measured by gleaning small sample plots immediately following harvest, must be subtracted from gross yield.

Field crops:

Concepts and general methodology used in objective surveys for forecasting and estimating yields are similar for all field crops. Sample fields are selected from fields identified during the June enumerative survey as having the crop of interest. A systematic sampling scheme is used for selection, following a geographical arrangement of fields. Self-weighting samples are achieved by assigning probabilities of selection which are proportional to expanded field acreages. This facilitates summarization and has proven to be efficient for estimating purposes. Observations are made on two randomly selected plots (units) in each of the selected fields.

Objective yield surveys are planned to coincide with the publication of production forecasts and estimates in the monthly Crop Production report. During the first survey month, crop maturity will vary considerably by area of the country. Appro-

priate counts, measurements, and other observations are made for each sample that will be used in the forecast models. Plant characteristics used as prediction variables change as maturity progresses. At an early stage, for example, a count of plants may be the only data available, but it is valuable in forecasting the number of mature fruits. If no characteristics are available to predict weight per fruit, historical averages will be used for the sample. As the crop matures, other variables become important. Actual fruit counts are used, and weights and measurements of the immature fruits are often useful in predicting final weight per fruit. Simple linear- and multiple-regression models are most often used to describe past relations between the prediction variables and the final observations at maturity. Typically, relations observed over the preceding 3-year period are used in current forecast equations. Forecasts of gross production are computed for each sample. Plots for most crops include two adjacent rows of predetermined length. Measurements are made to determine row spacing so that conversions can easily be made to yield per acre. An adjustment is made for expected harvesting losses, based on past averages. Individual sample yields are averaged to arrive at State estimates. Sampling errors are based on variation between sample yields.

As the season progresses and crops mature, the individual sample yields provide data for estimates rather than forecasts. Final preharvest observations are made as near harvest as practicable. Similarly, for best results it is desirable to do the postharvest work immediately following farmer harvest. When the information is available, actual harvesting losses are used in computing net yields.

Tree crops:

Sampling frames used for selecting blocks (fields) of trees have been developed by various means. In some cases, nearly complete lists of growers, classified by size of operation, have been made available through trade or marketing associations. Area frames have been constructed by identifying blocks of trees on aerial photographs. Stratification according to age of tree reduces sampling variability in some applications. In addition to its uses in sampling, the frame usually becomes the basis for estimating the population of trees.

Blocks of trees are sampled with probabilities proportional to the number of trees or acres, which results in a self-weighting sample. Counts are usually made on two to four trees per block. A random method is used for selecting a "pivot" tree with additional count trees selected nearby. This cluster reduces counting time within the block. The random-path method is commonly used for selecting count limbs on a tree. Beginning at the base and proceeding up the tree, a random selection is made at each point of branching until a count limb of suitable size is obtained. Probabilities proportional to the cross-sectional areas of the limbs are usually used in the selection process to gain sampling efficiency. An alternative to the random-path method is to select a primary limb as described, but map out the remaining branches into suitable count limb sections. A random choice of one or more of these sections can then be used for counting purposes. On mature trees, 5 to 10 percent of the tree is usually counted. The probabilities associated with each stage of selection must be used in expanding the limb counts to an estimate of fruit per tree.

Once fruit is set, forecasting becomes the task of projecting drop and growth. Most droppage occurs immediately following bloom, after which the fruit counts become relatively stable. Predicting weight of mature fruit is done by relating immature size or weights to final weights. Drop and growth patterns observed in past surveys are a requirement for the current forecasts.

Periodic surveys are used to update the projections of fruit drop and growth until harvest. An allowance must be made for fruit remaining after harvest, particularly if mechanical harvesting equipment is to be used. Since blocks are the primary sampling units, sampling errors of estimated production per tree are computed from variation between blocks.

PREPARATION OF ESTIMATES

Forecasts and estimates represent the combined effort of both the State Statistical Offices (SSO's) and the Washington, D.C., offices. Most sample data are collected, edited, summarized, and analyzed in the SSO's. State statisticians prepare the initial forecasts or estimates for their States and transmit them with supporting data and comments

to the Crop Reporting Board in Washington for review. An explanation of unusual local conditions or other pertinent information affecting an estimate is given in the statistician's comments.

In Washington, the State data are summarized nationally for each item. Estimates recommended by the State statisticians are reviewed by commodity specialists of the Crop Reporting Board. The reviewers have all the survey information that was available to statisticians in the States and can evaluate the data at the national and regional levels. For many commodities, State survey indications are summed for the U.S. level and a national estimate is set first. These procedures permit the use of check data and other survey information available at the national level. For example, some of the probability survey data are extremely valuable at the national and regional levels, but are more limited in value for State estimates because of relatively large sampling errors.

For all major commodities, including livestock species and crops identified as speculative, members of a formal Crop Reporting Board convene to review and adopt the official estimates. Each member makes an independent interpretation of all available data and recommends an estimate. The Chairman of the Board reviews these recommendations and reconciles differences of opinion.

RESEARCH

SRS continually conducts research aimed at improving the quality of its services to the public. The principal areas of study are briefly described below.

Sampling-Frame Construction and Maintenance

Through the past several years research and operational experience have resulted in an evolution of area frame construction. Most States now have a land area sampling frame based on stratification of land according to agricultural use. A recent advent to the basic design has been the use of interpenetrating sampling to select units from the frame. Within a land use stratum a set of independent samples are selected, using a random method. Interpenetrating sampling facilitates an orderly rotation plan of sampling units for enumeration. Other advantages are that a replication can be used as an independent estimating sample for special purposes, and the land use stratum variance may be computed quite easily by using the replicated means or totals.

Research in land area sampling-frame construction centers on fine tuning, or introducing greater efficiency in the methodology. Current investigations cover optimum stratification and segment size; ways to improve accuracy and quality-control measures; and exploration of new frame materials, such as high-altitude or satellite photographs. Since the land area sampling frame is the only complete sampling frame, SRS must maintain and improve the efficiency of its use, even though SRS relies heavily on the sophisticated application of list files as a partially complete frame for estimation.

A second area of research is in developing name list files suitable for use in multiple-frame sampling. A major problem associated with constructing such a file is identifying duplication of names within the file. The process of identifying duplication using computer technology is called "record linkage." Specifically, record linkage brings together two or more separately recorded pieces of information concerning the name of a particular individual or operation. Tasks within the overall heading of record linkage include data manipulation (the process by which unlike records are restructured to make them more comparable without changing the basic information) and information coding (the process of removing variations of alpha or numeric information by substituting a common code system). By performing these two steps, the similarity of records has been increased without changing their information content. Once these two processes are completed, it must be decided if individual records are linked with other records. Probabilities are used by a model to create the likelihood of link or nonlink, and a hypothesis test is used in deciding if two records are indeed the same. Finally, a method is developed by which information gained about name records may be retained so that the process of identifying unique list name sampling units improves over time through survey use.

Nonsampling Error

Research on nonsampling errors is directed at

the survey as an instrument to measure certain items of interest, such as crop acreage or numbers of livestock.

Nonsampling errors are to be distinguished from the sampling error, which arises from the use of a sample rather than the entire universe of elements to be studied. All other types of error are called "nonsampling errors," a term often loosely considered as synonymous with "response errors" and "measurement errors." Nonsampling errors are not necessarily related to the size of the sample, as are sampling errors. They may arise from errors of measurement, since any measuring instrument will vary in its ability to measure precisely the item of interest. A survey is subject to many sources of nonsampling errors: The frame may be unsatisfactory, sample selection may be biased, questionnaire design may be deficient, improper information may be recorded, mistakes may be made in processing the data, and data may be missing because of lack of response, etc.

Unlike sampling errors, nonsampling errors present considerable difficulty in the estimation of the variability that may be associated with them. It may be possible to measure some particular component of such errors, but there may still exist some unknown components. As a result, there has been little practical work done in the area of estimating nonsampling errors. More progress has been made in identifying sources of nonsampling errors.

Identifying the sources of nonsampling errors is the first step in developing procedures to remove them. Analysis of survey data and comparison of results of independent surveys measuring the same items may indicate sources of nonsampling errors. Sometimes such analyses or comparisons indicate that nonsampling errors are present, but do not identify the sources. If this occurs, an alternative is to reinterview by an independent method that is considered to be more accurate. This can be done with a subsample of survey respondents. It is assumed that the reinterviewing team is a more accurate measuring instrument, because better interviewers are used and the questionnaire is structured in greater detail to reveal the correct values if they are not obtainable by a direct question.

After sources of nonsampling errors are identified, it is necessary to develop procedures to measure the degree to which they affect the items of interest. One procedure is to use replicated sampling to build into a survey an experimental comparison of several different measuring processes, providing the measuring devices do not have the same type of systematic errors. Another procedure is to assign replications to interviewers to determine the variability in survey data that is attributable to the interviewers when it is not a systematic error. The idea is to make part of the survey a controlled experiment with precautions, such as randomization, that are typical of good experimentation.

Refusals are responsible for part of the nonsampling errors due to nonresponse. Procedures are developed and tested not only to reduce the number of refusals, but also to provide estimates of those that remain refusals.

Remote Sensing

"Remote sensing" means measuring an object or phenomenon from a distance, whether by photography or other radiometric technique using microwave instruments, spectroradiometers, multispectral scanners, etc. These measurements are of electromagnetic energy which is emitted, scattered, or reflected by the objects observed. Different objects return different kinds and amounts of energy. Remote sensing utilizes these detectable differences to identify ground objects or phenomena from the air or from space.

Crop identification and acreage measurement have been recognized as potential applications of remote sensing. An ideal approach might be to make acreage estimates from sensor information every 24 hours, but the data-handling problem and the lack of an all-weather sensor system makes this impossible except in special situations. Consequently, other ways have to be found to use remote-sensing data.

Several possible approaches are: (1) double sampling or multistage sampling, (2) multiple-frame sampling, or (3) using space imagery as an area frame on which broad land use classifications have been done. This land use classification would then be used in designing a stratified sample. Or space imagery could be used as a frame from which one could select a subsample of aircraft flight strips and, within flight strips, select area

segments. These area segments could then be photographed at a larger scale or enumerated on the ground. This is a multistage sample using several different kinds of information.

Likewise, space imagery of a county or State could be classified according to the crops of interest. From this classification one would select a sample (or use an existing sample) of area segments and collect the necessary information about these areas on the ground. This is a double-sampling technique in which the space information is the large sample, and ground survey provides the more detailed information. If the correlation between the ground information and the space data is high, substantial gains can be realized in making crop estimates for the total area.

Space imagery may also provide more efficient estimates by providing supplementary data. For example, it may be possible to classify crops by frame units in the present area frame. This would mean that if one were interested in corn, he could select the sample from frame units with probability proportional to the acreage classified as corn. If the correlation between the classified corn acreage and the actual acreage was high, gains in estimation using ratio and regression techniques could be realized.

Until an all-weather satellite is developed, an estimating technique must be developed that can be used where satellite coverage is incomplete. One solution is to use multiple-frame estimating techniques, such as using the space imagery to estimate the cloud-free area, and the aerial photographs and ground enumeration estimates for the area covered by clouds on the space imagery. Then, by proper weighting, all three data sources are combined to obtain an estimate for the total area.

Remote sensing has some potential in livestock estimation, particularly in hard-to-get-to areas or in areas of nonresponse. At present, this approach is limited to aerial photography with sufficient resolution and to areas where livestock occupy open areas, or areas with limited vegetation.

Yield Forecasting and Estimation

Research directed toward the development of objective methods of estimating and forecasting yields is conducted for a wide variety of crops. The estimation of crop yields at harvest and forecasting of yields yet to be realized are two distinct phases of the research effort. For most crops, the development of methods of estimating harvesting losses constitutes an additional phase.

Crop yield estimation is based on the observation of plant and fruit characteristics just prior to harvest, at harvest, or soon after harvest is completed. Research in estimating biological yield, harvested yield, and harvest losses involves developing methods which rely on statistical sampling and estimation theory. For purposes of efficient sampling and estimation, it is often useful to treat yield as the product of components such as weight or size per fruit, fruit per plant, and plants per acre.

Forecasting of yields involves predicting what has not yet happened. Methods of forecasting the final yield while a crop is still immature are obviously more difficult to develop than estimation procedures at harvest. Crop yields are the culmination of many factors. These factors are generally associated with the plant, its location, weather, and production practices. The timing and interaction of weather factors and the extremely complex interactions of all important factors make their direct use in predicting final yields extremely difficult. Fortunately, observations of the immature crop can be made which are often useful in predicting the resulting yield. Crops in an immature stage of development are a reflection of the collective and interacting effects of these factors over a portion of the growing season. Inasmuch as these same factors also constitute a primary influence on the mature crop, observations made at an immature stage provide a good basis for yield forecasts.

To develop successful methods of forecasting yields, it is necessary to discover specific plant characteristics which are useful predictors of yield. A comprehensive understanding of the fruiting behavior of a crop is the essential first step in the development of the predictive models. Forecast models designed to relate these characteristics to yield or its components may be based upon knowledge, verified by experimental studies, about plant growth and development during the season and time-related growth patterns. This knowledge may be acquired primarily through agricultural

research. Special investigative surveys are made to fill gaps in previous research and to adapt the models to current practices. In addition to models which rely on the repeatability of plant growth, and patterns adjusted for current fruit development, regression models based on the stability of parameters between years are in use. These models often incorporate the developmental stage of the plant and its fruit in order to utilize unique model parameters for individual maturity categories by States or agricultural regions.

Forecasting crop yields also requires efficient estimation of variables used in the models which have been developed. Sampling and estimation theory is utilized to achieve this efficiency. Since sampling considerations are usually sufficiently compatible for the predictive variables and estimates of final yield, the same sampling design can be used for obtaining both immature and mature plant and fruit observations. Thus relations between observations at various stages of maturity may be studied in great detail at the common elementary unit level or at other levels in a hierarchical sampling design. ■

Chapter 3

METHODS OF COLLECTING AND PROCESSING DATA

INTRODUCTION

The data collection program of the Statistical Reporting Service consists of a series of surveys designed to produce current agricultural statistics of acreages, yield and production of crops, livestock and poultry inventories, and other information pertaining to the agricultural economy. Most of this information is collected from farmers through many different sampling and surveying techniques. SRS survey methods have changed significantly during the past two decades. Prior to 1960, almost all SRS-published statistics were based on subjective nonprobability mailed questionnaire surveys. Today, many probability surveys, using an objective or enumerative data collection system, supplement the mail approach.

Data Sources

The most important source of survey data is the farm operator who voluntarily supplies information about his farming operations. Usually, only a small fraction of the Nation's agricultural producers are selected for a single survey. Some may be in a small preselected probability sample in which responses are collected by personal interview, telephone, or a mailed inquiry. Other surveys include a larger sample of farm operators where only mailed responses are used.

Data also are collected from agribusiness firms and merchants serving agriculture. Both suppliers of agricultural inputs and purchasers of raw farm outputs are important sources for developing statistics on agricultural commodities. In addition, these firms can often provide valuable data on quantities marketed or processed, which are used as check data to revise earlier estimates made from sample surveys. Data from these sources are especially useful in the nonprobability mail surveys.

Valuable data are also obtained through private and governmental agencies and trade associations by cooperative agreement or other informal arrangement with SRS. Examples include the United States census of agriculture, State farm censuses, producer associations, railroads, irrigation projects, financial agencies serving farmers, and others.

Data from administrative records, such as total marketings, shipments, or quantities processed, are sometimes available from these sources. The census of agriculture and State farm censuses are especially useful in preparing estimates for counties or other geographic areas within a State.

METHODS OF DATA COLLECTION

There are four principal methods of data collection.

Mail Survey

Mail surveys form an important part of the data collection activities in SRS. They are used for current estimates of crop acreages, production, disposition, and stocks; to indicate weekly development of crops during the growing season; to obtain forecasts of yield; to make estimates of prices received and paid by farmers; and to formulate estimates of livestock and poultry inventories and production.

The principle advantages of mail surveys are relatively low cost (compared with interview methods used in enumerative surveys) and the short time between mailing questionnaires, their return

and analysis, and availability of survey results.

A deficiency in mail surveys is the nonresponse by a significant number of individuals receiving questionnaires. Several techniques are used to overcome the effects of nonresponse. A second questionnaire or a postcard reminder is sent a week or so after the initial mailing to increase response, and interpretation of survey data is made with linear regression charts to adjust for bias (see chapter 2). For probability surveys, efforts are directed toward obtaining unbiased estimates for the nonresponse group, either by a complete enumeration of nonrespondents (where the sample is small) or by subsampling nonrespondents and enumerating all units in the subsample.

When U.S. agriculture was much less specialized than it is today, large-scale mail surveys were a satisfactory means of obtaining agricultural data. The relatively large group of nonrespondents did not pose a serious problem. Since most neighboring farms grew the same crops and frequently had similar livestock and poultry inventories as well, characteristics of respondent and nonrespondent farms were not greatly different. However, as farms became larger and more specialized, nonprobability mail survey techniques became less reliable, particularly for livestock, poultry, and other specialty commodities, because respondent and nonrespondent farms were more likely to be dissimilar. Alternative methods of data collection were necessary as emphasis shifted from sole reliance on large-scale nonprobability mail surveys to greater dependence on more scientific procedures.

However, mail surveys are still of low cost and useful for agricultural characteristics that are common to many farms, where the variability of the data to be reported is limited, and where the survey period is restricted. Examples are crop surveys, particularly those relating to crop conditions or yield, and surveys to measure prices received and paid by farmers. Surveys for more specialized data require adequate followup procedures for reliable results.

Mail surveys ask farmers for two kinds of information: Data relating to their own farms, and data relating to agricultural conditions in their localities. The individual farm data concern crop acreages, crop yields and production, livestock inventories, and milk and egg production. The locality data are subjective evaluations of agricultural conditions that reflect neighboring farms as well.

Responses relating to a farmer's own operation are considered more accurate than locality judgments, for most data. Locality questions are limited to those items about which a farmer has intimate knowledge, such as general crop conditions. In the past it was believed that this technique would give a more representative picture of changes in crop acreages, livestock inventories, and other items. However, a farmer's lack of exact information about acreages and livestock numbers on his neighbors' farms makes locality answers on these and other items less reliable.

Historically, the development of lists for mail surveys has not followed mathematical principles of sampling. Emphasis was placed on obtaining responses from a corps of persons who produced the commodities being surveyed, who were believed to be well informed, and who would report regularly. For general-purpose surveys, such as the monthly farm report survey, an additional requirement was that reporters be fairly uniformly distributed over the agricultural areas of the country. The names of farmers who might be prospective reporters were often obtained from key individuals in selected parts of the State, or through contacts made by the statisticians.

More recently, annual farm censuses, conducted in eight States by local assessment officials in cooperation with the SRS State Statisticians, have provided excellent master lists of names. Names of prospective reporters are also obtained from county agents, lists compiled in connection with production control and conservation programs of the U.S. Department of Agriculture, and membership directories of trade organizations, such as fruit growers' associations or poultry improvement associations. State license and inspection records and similar materials are also used as sources of names, particularly for those of manufacturing and processing plants. All lists compiled by SRS are used for statistical purposes only and are not available to the public.

Enumerative Surveys

Enumerative surveys require the collection of survey data pertaining to specific land areas (segments) which often include only portions of farms.

This is one reason why this type of survey does not lend itself to collecting data by mail. In addition, operators of land within these segments are usually not identified in advance. Obtaining survey data through personal interviews is expensive but provides uniformity of the data collecting and handling procedures for all State Statistical Offices.

Annually, SRS employs and trains about 1,500 enumerators to conduct personal and telephone interviews. At least 30 enumerators are usually employed in each State on a part-time basis. They are located throughout the State to expedite data collection and minimize travel and expense.

All enumerators are trained prior to conducting any survey work so that consistency and accuracy in data collection may be maintained. The training sessions are conducted by statisticians and usually last from one to three days, depending on survey size and complexity. Enumerators are expected to be familiar with the purpose of and need for each survey, to understand the survey concepts and procedures, and to have intimate knowledge of the survey forms and questionnaires to be used.

June enumerative survey

The June enumerative survey (JES) is conducted annually in the 48 conterminous States during the last week of May and first week of June. Data collected for SRS reports concern crop acres and land use, livestock inventory numbers, births of pigs and cattle, farm labor and related economic factors, farm population, and farm numbers.

The basic area frame sample used by SRS includes about 16,300 area segments. The number varies by States according to land area, and importance and diversity of agriculture. Most Midwestern States have about 350 segments and Southern States, 450. Texas and California have the most segments, with 850 and 1,000, respectively.

The area segments are completely enumerated; that is, all land within the sample must be accounted for and identified as to use. The segments include about 115,000 separate tracts, each represented by a different operator, who is contacted in person for information. Only about half of these tracts have agricultural activities.

A special list of operators of large hog, cattle, and chicken units is sampled and tabulated as part of the JES to maximize the sampling efficiency and improve estimates. Designated State Statistical Offices have also developed specialized lists of potato and white-corn growers for similar purposes. Selected list sample operators are usually mailed a special questionnaire and nonrespondents are contacted by telephone or personally interviewed.

July acreage update

An annual July survey uses a subsample of 11,000 JES tracts to update planted and harvested acreage estimates based on the JES. In addition, this survey serves as a quality check of information obtained in the JES. Data are collected by personal enumeration during July for use in publishing current acreage estimates with the August 1 Crop Production report.

December enumerative survey

The December enumerative survey is conducted annually in 48 States during the last week of November and the first week of December. Operators of 20,000 tracts (a subsample from the June enumerative survey) are personally visited and information related to their land obtained as in June. In addition, a list of large hog, cattle, and chicken producers is sampled and data collected from about 10,000 of them. They are mailed a questionnaire, and those not responding are contacted by telephone or personal visit.

The December survey emphasizes collecting information for estimating livestock and poultry inventories, pig and cattle births, deaths, and number of head butchered for home consumption, and acreage of fall-seeded wheat and rye. The survey is also used to estimate incompleteness of farm operator lists in the 29 States with multiple-frame livestock surveys and in the 10 States with white-corn acreage and production surveys.

Multiple-Frame Survey

SRS is finding many applications for multiple-frame techniques which follow principles of probability sampling. The use of a list frame which represents a significant portion of the universe of interest enables much of the data to be col-

lected inexpensively by mail. Telephone interviews are widely used to obtain data from nonrespondents and to clarify questionable data submitted by mail. Unless the questionnaire is complex, personal interviews need be used only for the area frame sample and nonrespondents that cannot be reached by telephone.

Livestock

Multiple-frame methods were used in livestock surveys starting in 1967 to provide cattle and hog estimates with sampling errors of 1 percent or less at the U.S. level. Results included improved reliability of State estimates over those obtained from either area frame surveys or nonprobability mail surveys. Additional States were included in the program as funds permitted.

By 1974, 14 States were involved in the hog multiple-frame program and 28 States in the cattle multiple-frame program, representing 85-90 percent of the U.S. hog and cattle inventories.

Under these programs data are collected each quarter (March 1, June 1, September 1, and December 1) for hogs and twice each year (January 1 and July 1) for cattle.

Questionnaires are designed so that the respondent will include all animals on land operated, regardless of their ownership. Special questions are used to assist in defining his unit in terms of the land operated. Names of all other individuals that have an interest in the operation are requested so that duplication in reporting livestock can be avoided.

Most States use trained telephone enumerators located at a supervised central location to interview mail nonrespondents. Those in the sample who did not respond by mail and cannot be contacted by phone are interviewed in person.

Quarterly agricultural labor

The quarterly agricultural labor survey also uses a list frame in conjunction with the area frame. The list is composed of employers of agricultural workers. In addition to measuring the incompleteness of the list frame, the area frame is also used to estimate the number of paid and unpaid family members doing agricultural work.

The area frame sample is selected from operators identified during the June enumerative survey. One type of questionnaire is mailed to these operators and used for the nonresponse interview followup. Another type of questionnaire is used for personal interviews of those on the list sample, since the list sample usually includes larger and more complex operations.

Farm production expenditures

The farm production expenditure survey also employs the multiple-frame technique. The list frame includes most farms having crops and livestock production valued at $20,000 or more. The area frame provides coverage for all operations not on the list frame.

All data are collected by personal interview each February or March and pertain to the previous year's expenditures. The survey questionnaire includes much detail and is more complex than most SRS surveys. One interview sometimes may take several hours to complete.

Objective Yield Survey

Although crop acreages for specific commodities change from year to year, some of the largest variations in crop production are caused by fluctuations in the yield per acre. For the better part of a century, yield forecasts were based on voluntary producer appraisals of expected yield. This survey procedure generally produced satisfactory crop forecasts and continues to be used. However, large yield variations are often not fully reflected in growers' subjective appraisals. This problem led to the development of objective methods to forecast and estimate yields of major crops in the national program. Objective procedures include actual counts and measurements of plant characteristics in sample fields by trained enumerators, and laboratory analysis of fruit from the crops. A national program of objective yield surveys is conducted for corn, cotton, potatoes, soybeans, and wheat.

For the national objective yield programs, a sample of fields enumerated in the June or December enumerative survey is selected for making counts and observations. Theoretically, all fields of a crop have a probability of selection proportional to acreage. This provides a self-weighting sample which simplifies estimation and summarization. The location of plots within the fields

is determined in a random manner before entering the field so that all areas of the field have equal probabilities of being selected and potential biases are minimized.

Special emphasis is placed on designing survey forms for recording the monthly observations. Work on forms often begins during the previous year's survey. Improving the forms involves the combined assistance of the survey, commodity, and research statisticians coupled with feedback from enumerators who do the actual field work. Form designers strive to make questionnaires easy to follow, attractive to the eye, and convenient for recording and summarization. As with all SRS questionnaires, objective yield survey forms have to be approved by the Clearance officer for the Department (an SRS statistician) as well as by the Office of Management and Budget.

Probably the most difficult phase of an objective yield survey to implement effectively is an orderly, standardized system of data collection by the large corps of field enumerators. Rigid procedures are established and documented in field manuals to assist with the data collection activities and to avoid, as much as possible, potential problems inherent in the interviewing and objective field observations. It is a practice to critically review the initial work done by each enumerator during a survey so that difficulties can be corrected at an early stage.

Each State Statistical Office appoints one of the regular professional statisticians as State supervisor for objective yield surveys. These supervisors are trained at national schools for each of the crops in the objective yield measurement program and are responsible for locating, hiring, training, and supervising the field enumerators. Most enumerators are local farmers, farm wives, or members of a farm family, retired rural residents, and other available persons with an interest in agriculture. The enumerators are part-time employees having broad differences in age and education, who are trained for a few days prior to the survey and receive minimal supervision while in the field. Many enumerators have been working several years for SRS on these surveys.

Counts and measurements are conducted during three basic crop development periods. During the first period, plants characteristically make rapid vegetative growth, and fruit development is generally absent or in a very immature state. The second period is midseason, when plant output is in transition from vegetative growth to fruit development. During the final period, the plant function is directed strongly toward fruit development. Plant counts and measurements vary by stage of development and correspond to plant characteristics used in the forecasting and estimating model.

Just prior to the time the farmer harvests the field, the sample plots are harvested by the enumerator and the gross yield per acre for the sample is computed. The enumerator returns to the plot for gleanings after the farmer's harvest. The harvesting losses are subtracted from the gross yield to determine net yield for each sample.

The objective yield measurement program has become a vital, strengthening factor in improving monthly production forecasts and estimates throughout the crop season. There is a continual effort to improve procedures, simplify forms, and update methods to keep objective yield surveys responsive to the continuing changes in the crop production activities of the Nation's agricultural economy.

DATA PROCESSING

Methodology for handling survey data is changing as rapidly as any aspect of SRS work. As recently as 1960, nearly all raw survey data were hand edited and tabulated by simple clerical procedures. Today, virtually all survey data are edited and summarized by computers. In addition, maintenance of list files and many other record-keeping activities are also dependent on automatic data processing (ADP). The period of development of ADP coincides with the implementation of SRS probability surveys. Without ADP, summarization and analysis of data from some of the current sample designs would not be possible.

The original application of ADP was in the summarization of survey data. Computers perform the repeated calculations needed for summarization much faster and more accurately than comparable hand tabulation procedures. Although computer processing requires lead time for system development and programming, more detailed

and complex summaries can be provided with little penalty in cost for processing time. This greater detail enables statisticians to thoroughly analyze survey data.

Editing of raw survey data (that is, searching and correcting the data for errors) has been a more recent application of ADP. Computers are now used effectively for identifying errors in data from most SRS surveys. Many data checks can be done more accurately, consistently, and rapidly than by a personal review. Consistency checks of various kinds are used, such as checking reported data items against predetermined limits or comparing one item with other related items reported on the same questionnaire. Computer-detected errors are often referred to as "critical" or "noncritical." Critical errors are those in which discrepancies in the data are obvious and must be corrected. The noncritical errors are those in which the data item is suspected of being in error but after further review or verification by the respondent may be accepted. Most of the computer editing to date has been to identify or flag suspected errors in data. Only limited use has been made of computer imputation techniques which involve the supplying of missing data, or the correction of erroneous data based on averages, relationships to other data, or data for comparable reporting units.

Computer capabilities are widely used for handling list sampling frames. Developing, updating and maintaining some of the large list frames used by SRS would not be possible without the ability to quickly process these files. Routine list work often includes a variety of sorts, merges, and corrections. Samples are then selected and labels for mailing survey questionnaires printed directly from the computer files.

One of the more difficult areas of list handling is the identification of duplicate names within a list, particularly when more than one list source is used. Considerable effort is currently being made to improve procedures for identifying this duplication through ADP.

Basic responsibilities for processing survey data lie within the SRS State Statistical Offices. However, because of the limited availability of large-scale computer facilities and technical resources in the SSO's, the first SRS computer systems and programming efforts were for national probability surveys to be processed at the central headquarters in Washington, D.C. As equipment and technology have become more widely available, the SSO's have assumed much of the ADP responsibility for SRS surveys. Surveys still processed in the Washington office are primarily those national in scope and requiring considerable technical inputs from the Washington, D.C., staff. But even for some of these surveys, the computer edit responsibilities have been shifted to the SSO's.

To avoid duplication of effort and nonconformity in processing between SSO's, procedures were developed for standardization of the data-processing activities of SRS. A generalized systems approach to automation was established for handling most of the data-processing needs. Agency-wide task forces were used to develop these systems. Some generalized systems in use by SRS are the mail list system, generalized edit, generalized summary, multiple-frame summary and list universe systems. These systems are used by the SSO's for their various surveys, eliminating duplication of programming effort and providing more uniformity in ADP.

Another development in ADP of considerable significance to SRS is network processing. In 1973, selected SSO's and the central Washington office were connected to a telecommunications network. The goal of SRS is to have all SSO's and Washington, D.C., connected to the same network. Each office will have access to the network and central computer through terminals located in their respective offices. Network processing, when fully implemented, has many advantages. Generalized systems need to be set up at only one location, but can be accessed and used by all. This will minimize duplication of systems and programming work. Data transmission to and from Washington, D.C., will be greatly improved. Further standardization of processing procedures will be realized. An official estimates data base is planned for the network that will allow a variety of SRS estimates to be made available in machine media to data users throughout the United States, both in Government and in the private sector. ■

Chapter 4

FIELD AND SEED CROPS

INTRODUCTION

The statistical program encompasses major field and seed crops at both the State and national levels. Generally, estimates are made for planted acreage (both prospective and actual plantings), harvested acreage, yield, and production during the growing season and at season's end. Estimates are made of the commodities stored on and off farms, and of the disposition of crops. Price and value statistics are also published for these crops.

Estimates of harvested acreage and production for most major field crops originated in 1866. Estimates of planted acreage for field crops, and on harvested acreage and production for major seed crops were initiated in 1919.

The program is reviewed periodically and adjusted to fit changing situations by the subsequent addition or deletion of States or crops. For example, buckwheat estimates were once published for 12 States, but production waned and the last official estimates were made in 1964 for 4 States. Conversely, appropriations were granted by Congress in 1971 to establish an estimating program for the newly important white-corn crop in 10 major producing States.

Estimates are based primarily on the sampling principles described in chapter 2. Probability enumerative and general mail nonprobability surveys are employed extensively in collecting acreage, production and stocks data; area frame sampling is increasingly important. Data on local crop conditions and expected yields provided by volunteer reporters in the monthly general mail survey are major indications for forecasting yield and production. Objective yield surveys are used in forecasting and estimating production of corn, cotton, wheat, and soybeans. All survey operations are conducted through the State Statistical Offices, where questionnaires are checked for completeness and reasonableness prior to summarizing at the State level.

Many of the crop production estimates are checked against respective marketing and processing information, such as soybean crushings, cotton ginnings, tobacco in warehouses, and receipts from sugar factories at the end of the marketing season. The census of agriculture provides another check source. Revised estimates are made, particularly at the State and county levels, when appropriate, based on the check data and reevaluation of the original survey indications.

Field crop reports coincide with the progression of the crop year. An initial report for the coming year includes fall seedings of winter wheat and rye, followed by prospective plantings of spring-planted crops. Actual plantings and acreage intended for harvest are reported at midyear with forecasts of yield and production issued during the growing and harvesting season. Finally, acreage actually harvested, final yield, and production are reported at the end of the year. Periodic reports of stocks and the farm disposition of the crops are then made through the crop marketing year. The type of information available for each crop is noted in table 1 on the following pages:

Table 1.—Statistical coverage of field and seed crops

Crop	Acreage intentions	Forecasts		Acreage		Production	Production, by classes, by types	Stocks	Disposition	Prices received by farmers	Value of production	Va'ue of sales
		Harvested acreage	Production	Planted	Harvested							
Field crops:												
Barley	●	●	●	●	●	●		●	●	●	●	●
Beans, dry edible	●	●	●	●	●	●	●		●	●	●	●
Broomcorn		●	●		●	●				●	●	
Corn, all purposes	●			●								
Corn for grain		●	●		●	●		●	●	●	●	●
Corn for silage					●	●				●		
Corn for forage					●							
Corn, white	●	●		●	●	●						
Cotton lint	●	●	●	●	●	●				●	●	
Cotton seed			●			●			●	●	●	●
Flaxseed	●	●	●	●	●	●		●	●	●	●	●
Hay, all	●	●	●		●	●		●	●	●	●	●
Hay, alfalfa and mixtures		●	●		●	●				●		
Hays, all other		●	●		●	●				●		
Hops		●	●		●	●		●	●	●	●	●
Mint for oil		●	●		●	●	●			●	●	
Oats		●	●	●	●	●		●	●	●	●	●
Peanuts grown alone, all purposes	●			●	●							
Peanuts for nuts		●	●	●	●	●		●	●	●	●	●
Peas, dry field	●	●	●	●	●	●	●		●	●	●	●
Popcorn		●		●	●	●			●	●	●	●
Rice, rough	●	●	●	●	●	●		●	●	●	●	●
Rye		●	●	●	●	●		●	●	●	●	●
Sorghums, all purposes	●			●								
Sorghums for grain		●	●		●	●		●	●	●	●	●
Sorghums for silage					●	●				●		
Sorghums for forage					●							
Soybeans, all purposes	●			●								
Soybeans for beans		●	●		●	●		●	●	●	●	●
Sugarcane for sugar and seed		●	●		●	●				●	●	
Sugarcane sugar and molasses						●						
Sugar beets for sugar	●	●	●	●	●	●				●	●	
Sugar beet sugar, pulp, and molasses						●						
Tobacco	●	●	●		●	●	●			●	●	
Wheat, all	●	●	●	●	●	●	●	●	●	●	●	●
Wheat, winter		●	●	●	●	●				●	●	
Wheat, durum	●	●	●	●	●	●		●		●	●	
Wheat, other spring	●	●	●	●	●	●				●	●	
Seed crops:												
Alfalfa		●	●		●	●		●	●	●	●	●
Bentgrass					●	●		●		●	●	
Bluegrass, Merion Kentucky					●	●		●		●	●	
Bluegrass, other Kentucky						●		●				
Crimson clover		●	●		●	●		●		●	●	

Table 1.—Statistical coverage of field and seed crops—continued

Crop	Acreage intentions	Forecasts		Acreage		Production	Production, by classes, by types	Stocks	Disposition	Prices received by farmers	Value of production	Value of sales
		Harvested acreage	Production	Planted	Harvested							
Fescue, chewings					●	●		●		●	●	
Fescue, red					●	●		●		●	●	
Fescue, tall		●	●		●	●		●		●	●	
Ladino clover					●	●		●		●	●	
Lespedeza					●	●	●	●	●	●	●	●
Orchardgrass					●	●		●		●	●	
Red clover		●	●		●	●		●	●	●	●	●
Ryegrass					●	●		●		●	●	
Timothy		●	●		●	●		●	●	●	●	●
Vegetable seeds					●	●	●	●				
Vetch, hairy					●	●		●		●	●	

ACREAGE, YIELD, AND PRODUCTION

Acreage

Acreage and yield are the two components used in forecasting and estimating production and are significant to sound agricultural research, planning, and program administration. Acreage reports help farmers plan and adjust their operations, serve as direct measures of land utilization, and point out demand for various farm production supplies and labor.

Prospective plantings

The SRS acreage series for spring-seeded crops begins with the prospective planting estimates. These estimates are based on mail surveys, with approximately 390,000 farmers receiving questionnaires regarding spring planting plans. Normally one-fourth of the questionnaires are returned; they are the basis for computing acreage indications.

Participating farmers in about two-thirds of the States receive a questionnaire asking for the number of acres planted the previous year and acreages they intend to plant in the coming season (historical/current questionnaire). Producers in the remaining States are asked to supply only current-year acreage plans. The State indications computed for each crop from the individually farm-reported data include (1) ratio to all land in farms, (2) ratio to cropland (in some western States), (3) percentage change from the previous year based on matched reports, and (4) percentage change from the previous year based on the current report of acres planted the previous year and acres intended to be planted in the current year in States using the historical/current questionnaire.

The percentage change indication, based on matched reports, is computed in all States using the current year questionnaires. The match with corresponding farm reports received from identical farmers the previous year is a major task without automated data processing systems. The task of computing the percentage change indications is simplified, however, when the historical current questionnaires are used, because data for both years appear on the same questionnaire. One disadvantage of this type of questionnaire is that data reported by farmers for the preceding year are often subject to error because of memory bias or other reasons. The shift from the use of the historical/current questionnaire to the "current-year" questionnaire is being made in additional States as sampling methods and data processing capabilities permit. The change eliminates the memory bias problem and reduces respondent

burden for reporting farmers.

The estimates are based on interpretations of the survey indications for each State, utilizing regression charts as described in chapter 2 under Data Interpretation. The national estimates are obtained by summing the individual State estimates. Differences between reported intended plantings and actual plantings can vary considerably, depending on changing circumstances. Changes in either economic or weather conditions can result in considerable shifts from early plans. Table 2 shows the percentage change, 1964-1973, from the March Prospective Plantings report to the final planted acres for corn, cotton, and barley.

Table 2.—March acreage estimates for United States as percentage of final planted acreage.

Year	Corn	Cotton	Barley
1964	105	100	111
1965	103	101	107
1966	103	105	104
1967	99	106	102
1968	100	102	98
1969	100	101	100
1970	100	102	102
1971	97	98	98
1972	102	97	98
1973	100	105	97

Both probability enumerative and nonprobability mail surveys are conducted to establish midyear planted acreage estimates, but only nonprobability mail surveys are carried out for the prospective planting acreage estimates. The advantage of the added precision possible with the more costly probability survey is negligible for estimating prospective plantings, because such precision would in many cases be nullified by the greater differences resulting from changes in producers' plans between survey time and actual planting.

Midyear acreages

Major nationwide enumerative and mail surveys are conducted about June 1 to establish estimates of spring-planted acreages and acreages for harvest. The results are released in the July Crop Production report.

Acreage questionnaires are mailed to approximately 470,000 producers; about one-third of the questionnaires are returned and are used in computing the indications. Additional special questionnaires go to growers of certain crops (such as dry beans and peas) to assure an adequate sample size for crops with relatively few producers. The same kinds of indications are computed from this mail survey as for the prospective plantings surveys. Regression charts are used to evaluate the indications from the mailed surveys in setting the estimates.

The June enumerative survey includes acreage data on about 0.6 percent of the total U.S. land area. The primary indication from this survey is the direct expansion of reported acreages. Additional indications obtained from the June enumerative survey include a ratio of current year data to the previous year's data for those area segments that were enumerated both years, and a ratio-to-land indication.

The size of the area frame sample was established to obtain a relative standard error of 2 percent at the national level and about 6 percent at the State level for the direct expansion for major crop acreages. For corn, the most widely grown crop, the standard error is nearer 1 percent at the national level and less than 6 percent for major producing States. The standard errors for soybeans, winter wheat, and oats are near the 2-percent, and cotton near the 3-percent, level for the Nation. The relative standard errors for minor crops exceed those for the major commodities.

The Crop Reporting Board sets the national estimates for major crops, using the June enumerative survey expansions and the mail survey ratio to land and percentage change from the preceding year's indications. This procedure utilizes the enumerative survey expansions at their greatest level of precision. State estimates are reviewed by the Board and adjusted to add up to the national estimate.

Prior to the initiation of the enumerative survey in the midsixties, State estimates were established individually and added to obtain the national totals. Estimates of planted acreages and acreages for harvest for less widely grown crops are still established on an individual State basis and summed to the national total. The enumerative survey expanded data for these crops have larger relative standard errors, which limits the value of first establishing national levels. Special surveys of known growers of many of these crops supplement the general-purpose surveys to provide the needed reliability at the State level.

The estimates of planted acreage published in the July Crop Production reports are normally not changed during the crop season. However, if planting is incomplete when the survey is taken in June, additional information is collected in July from a subsample of those reporting in June. A ratio indication of change from the June survey is computed and summarized at the State and national levels. Revised estimates of planted acreage are made and published in the August Crop Production report when the July survey shows that revision is needed.

Midyear estimates of harvested acreage[1] are based on reported acres for harvest for the earliest harvested crops, such as the small grains. For the later harvested crops, such as corn and soybeans, normal allowances are made for abandonment and acres used for other purposes. The estimates of acreage for harvest are subject to revision monthly, although they usually remain unchanged through the season. Current monthly acreage indications are obtained from the objective yield measurement program for corn, cotton, wheat, and soybeans; and for other crops from special surveys conducted when unusual weather or economic conditions occur that could result in changes in the acreage to be harvested.

Forecasts of Yield and Production

Forecasts of expected yield and production are issued during the growing season and estimates are issued at season's end. Forecasts and estimates are considered by SRS to be two distinct concepts. Forecasts relate to an expected future occurrence, such as crop yields expected prior to actual harvest of the crop. Estimates generally refer to an accomplished fact, such as crop yields, after the crop is harvested.

The first forecasts of yield and production are made in the December preceding harvest for winter wheat; in July for corn, flue-cured tobacco, spring and durum wheat, and other small grains; and in August for later harvested crops, such as cotton, hay, peanuts, rice, sorghum, soybeans, and sugar. Winter-wheat forecasts are made again in May and monthly thereafter through the season; forecasts for most other major crops are made monthly following the initial forecast.

The monthly forecasts are based on indications obtained from both probability and nonprobability surveys. Crop reporters provide subjective appraisals of local crop conditions and expected crop yields. General mail questionnaires are sent monthly to about 75,000 crop reporters and normally about one-third are received and summarized. In addition, to supplement the general surveys, special questionnaires are sent to known producers of some crops which are grown in limited areas. Enumerators make objective yield counts in sample fields of approximately 3,200 corn fields, 2,500 cotton fields, 1,700 soybean fields, and 2,500 wheat fields.

The Crop Reporting Board adopts corn, cotton, soybean, and wheat forecasts for major producing States by first establishing regional levels, utilizing indications from the probability objective yield measurements and from nonprobability mail surveys. The individual State forecasts within the region are then adjusted to add up to, within rounding limits, the regional levels on the basis of the individual State indication. The forecasts of these crops for the smaller producing States are established individually, based on their respective survey indications, as are all State forecasts for crops not in the objective yield measurement program.

State yield forecasts are adopted and multiplied by the current State acreages for harvest to establish the State production forecasts. The sum of the State production forecasts is then divided by the sum of the State harvested acreages to derive the U.S. yield forecast.

A "limited-forecast" program was initiated in 1971 for most crops to conserve resources. The States of least production for each crop—those which individually account for less than 1 percent and collectively account for less than 5 percent of the U.S. production—are designated "limited-forecast" States for the crop. The initial forecast of the season is made for a crop, then carried forward unchanged in the succeeding monthly forecasts for these States. No new survey data are collected until the end-of-season surveys are made for the estimates published in the annual crop summary. This limited-forecast program was adopted only after study indicated that the program would not significantly affect the reliability of the national forecasts.

Reported condition

One of the original statistical activities of the Department was the reporting of condition of crops during the growing season. Later, about 1880, the concept of normal condition was initiated, with "100" used to designate normal condition. The concept is still used for the early-season forecasts when crop development has not advanced to the stage where farmers can reasonably evaluate their plantings and report expected yields.

Crop reporters are instructed to "Report the condition of crops now, as compared with the normal growth and vitality you would expect at this time, if there had been no damage from unfavorable weather, insects, pests, etc. Let 100 percent represent a normal condition for field crops." The "normal" condition of a crop varies from one locality to another with differences in soil and climate. It also changes slowly in the same locality because of changes in varieties, cultural practices, and soil fertility.

Shifts in the reported condition alone do not fully explain trends in yields. Multiple-regression charts are used for some crops, with time as a separate variable to allow for trend. A simple regression of condition-versus-estimated yield is charted and deviations from the regression line are plotted against time on another graph. Chart readings of current condition indications combine the regression value with an increment for trend read from the deviations-against-time chart. (See discussion in chapter 2.)

Reported yields

As the crops near maturity, crop reporters are asked to report the probable average yield in their localities. Averages of crop reporters' expectations of yield are translated into yield forecasts by means of regression charts on which final yields are plotted against reported probable yields for a series of years.

The objective yield data collected for corn, cotton, soybeans, and wheat include monthly plant and fruit counts. (See chapter 2 and commodity discussions later in this chapter for details.)

The possibility of using weather data to forecast and estimate crop yields has been investigated on numerous occasions for most sections of the United States. The effects of weather and cultural factors are so complex that weather data alone do not provide a practical basis for estimating prospective crop yields per acre. Usually the effectiveness of rainfall is reflected in the reported condition or expected yield of a crop.

Rainfall data have, however, proved useful in estimating the winter-wheat and soybean crops, especially in areas where precipitation is very influential in determining the final yield. The total rainfall during certain months has been used together with the reported condition or probable yield to reflect some measure of the ability of the crop either to respond to additional moisture or to withstand deficient rainfall. Multiple-regression equations are used, with reported condition or probable yield, rainfall during specific months, and time as separate variables in the equation, which is:

$$Y_c = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4$$

in which

- Y_c = computed yield per acre
- x_1 = reported condition, or probable yield per acre
- x_2 = precipitation for specified months prior to the date of forecast
- x_3 = precipitation for specified months after date of forecast
- x_4 = time
- b_i = multiple regression coefficients

A forecast of prospective yield or production on a given date assumes that weather conditions and damage from insects or other causes will be about normal (or the same as the average of previous years) during the remainder of the growing season. Forecasts based on current conditions and objective counts may be appraised accurately. However, if weather, disease, insects, or other conditions change, the final estimate may differ significantly from the earlier forecast. The corn crop forecasts of 1970 and 1972 are examples of such changes. In 1970 the corn blight appeared after the August crop survey and the final U.S. corn yield was 8.5 bushels below the August forecast. An opposite situation occurred after August 1 in 1972 when nearly ideal moisture and temperature conditions improved prospects and the final U.S. corn yield was 10.5 bushels above the August 1 forecast. The difference between the August 1 forecasts and the final esti-

mates would have been smaller in these years if more normal conditions had prevailed after August 1.

End-of-Year Estimates of Acreage, Yield, and Production

Estimates of acreage, yield, and production for barley, dry edible beans, oats, rice, rye, and wheat are published in the December Crop Production report and again, along with all other field crops, in the Crop Production Annual Summary the following January.

The harvested acreage, yield and production estimates are based on acreage and production (A&P) mail surveys and for wheat on final objective yield data. The mail surveys are conducted after most of the field crops have been harvested. Most States conduct two general A&P surveys, one in August or September for small grains and another in November or December for the later harvested crops. However, in a few States the crop harvest periods permit conducting only one A&P survey for all crops. Separate surveys of known producers are conducted for some crops not widely grown, or grown only in limited areas of a State, to supplement the data collected on the general surveys covering several crops.

Over 800,000 questionnaires are mailed for the A&P surveys. Farmers report acres planted and acres harvested for each major crop utilization, such as grain or silage, acres abandoned or used for other purposes, and production for each major utilization.

The principal indications computed from the A&P survey for harvested acres are (1) ratio to land, (2) ratio to cropland (some States), (3) percentage change from the preceding year, based on matched reports and (4) percentage of planted acres utilized for grain, silage (for some crops), and abandoned. The A&P yield indications are derived by dividing the reported production by reported acres harvested. The final yields obtained from the objective yield surveys of corn, cotton, soybeans, and wheat are based on production harvested from the sample plots by enumerators, less harvesting losses (which are determined after farmer harvest of the crop by gleaning other nearby sample plots newly selected for that purpose).

Regression charts are used for interpreting the A&P mail survey indications to minimize the effect of biases that are present because of selectivity in the list and responses. The A&P survey indications and final objective yield data are the primary data sources considered in establishing the preliminary estimates. Consideration is also given to prior survey results and other available data. Supplemental information is obtained for certain crops from dealers and factories that contract acreage or production. Sugar beet factories, for instance, provide useful data on planted and harvested acreage and production.

Estimates are established on an individual State basis. The national levels of harvested acreage and production are the sum of the individual State totals; the U.S. yield is derived by dividing the U.S. production by the U.S. acreage for harvest.

Data obtained by the Bureau of the Census from cotton ginners provide a check of the cotton production estimate. State assessors' reports provide check data on acreage and production in some States.

Revised Estimates of Acreage, Yield, and Production

Estimates for all crops are subject to review and revision, if necessary, at the end of the crop marketing year. Revisions for the preceding year's crop are published for peanuts in the April Crop Production report, for cotton and tobacco in May, for sugar crops in June, and for dry edible beans, rice, and small grains in December. Revisions for most other field crops are published the following January in the Crop Production Annual Summary.

The revisions, when made, are based on data that become available after the preliminary crop estimates. Such check data may include reports on cotton ginnings, soybean and flaxseed crushings, tobacco marketings, and peanut inspection. Some State assessors' reports provide check data on acreage. The preliminary estimates are viewed in the light of such check data and revised when necessary. A reevaluation of the earlier indications is performed and revisions are made in acreage and/or yield, when appropriate, to harmonize production levels with check data and original survey indications. Further review and revision are not considered until the next census of agriculture.

GRAIN AND OILSEED STOCKS

Quarterly reports indicating stocks of feed grains, food grains, and oilseeds on farms and in commercial storage off farms are an important part of the crop estimating program. Stocks of corn, sorghum grain, oats, barley, wheat, rye, and flaxseed are estimated as of the first of January, April, July, and October. However, soybean stocks are estimated as of September 1 instead of October 1, and rice stocks as of August 1 rather than July 1, to coincide with the end of the marketing season for these crops. Hay stocks are limited to farm stocks as of January 1 and May 1. Peanut stocks are published monthly. Details are given under the specific commodities.

Farm Stocks

The basic data for quarterly estimates of farm stocks are obtained from nonprobability mail surveys in all States, plus probability surveys in 12 North Central States (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin).

In the mail surveys, crop reporters are asked to report for each commodity their production for the crop year and quantity on hand from the current and prior crop years' production as of the date of the survey.

A ratio of stock to production is computed from the general mail survey. The indication is plotted on time-series graphs to provide analysis of quarter-to-quarter and year-to-year changes of both stocks and disappearance.

The sample for the probability survey in the North Central States is selected from farm operators included in the June enumerative survey, who are contacted by mail, phone, or personal interview each quarter. The crop year production is obtained the first quarter of the marketing year and the quantity of grain on hand is obtained each quarter. Three indications of stocks are obtained from the probability survey: (1) Direct expansion of reported stocks; (2) ratio of stocks to production; and (3) ratio of current quarter stocks to previous quarter stocks.

The Crop Reporting Board summarizes the survey data from the probability and nonprobability surveys in the 12 North Central States to obtain regional indications. Estimates are established by the Board for the region, and individual State estimates are then set that will sum, within rounding limits, to the regional levels. Estimates are established on a State-by-State basis for all remaining States.

Off-Farm Stocks

Indications of stocks of grain and oilseed crops in commercial off-farm storages are obtained from quarterly surveys. Lists of all known commercial grain storage facilities and their capacities are maintained in each State Statistical Office. The lists are divided into groups of similar plants, such as mills and elevators, terminals, oilseed processors and other storages; each group is stratified by size. Estimates are made for each group and totaled for the estimate of stocks in all off-farm storages. A complete enumeration is made of the largest units, but smaller facilities are sampled. All rice storage facilities are enumerated. About 85 percent of the total grain and oilseed storage capacity is included in the survey returns.

Separate tabulations and expansions are made of the reports for each group of plants in the States. Stocks estimates for the sampled portion of the grain storage facilities are based on three indications: (1) An average-stocks expansion (2) a ratio-to-capacity expansion, and (3) the results of the application of the regression method. For the first indication, the average stocks for the reporting plants are expanded by the total number of plants in each stratum. For the second indication, the ratio of stocks to the capacity of reporting firms is applied to the total universe capacity. The regression method affords a refinement of the second indication to adjust for any consistent bias in the sample.

The expansion based on average stocks per plant is a good indication of stocks when the average plant capacity is the same for the sample and the universe. However, if the average capacity of the reporting plants is either smaller or larger than for all plants, this indication would probably be biased.

The expansion based on ratio to capacity is a reliable indication of grain stocks when the ratio of stocks to plant capacity tends to be the same for all plants regardless of size and response rate. It is reasonable to assume that these ratios are

approximately equal when stocks are large and virtually all plants are nearly filled to capacity.

The regression method provides a more reasonable adjustment for the discrepancy between the reporting firms and all firms. This method will give the same result as the ratio estimate, if the relation between stocks and capacity of reporting firms and all firms is a simple proportional line. However, if this is not true, the regression adjusts for the discrepancy in average size of plant. This adjustment is made by the equation:

$$Y'_s = Y_s - b(X_s - X)$$

in which

Y'_s = adjusted average stocks for plants in the sample

Y_s = observed average stocks for plants in the sample

b = regression coefficient of stocks on plant capacity

X_s = observed average capacity for plants in the sample

X = average capacity of all plants in the State

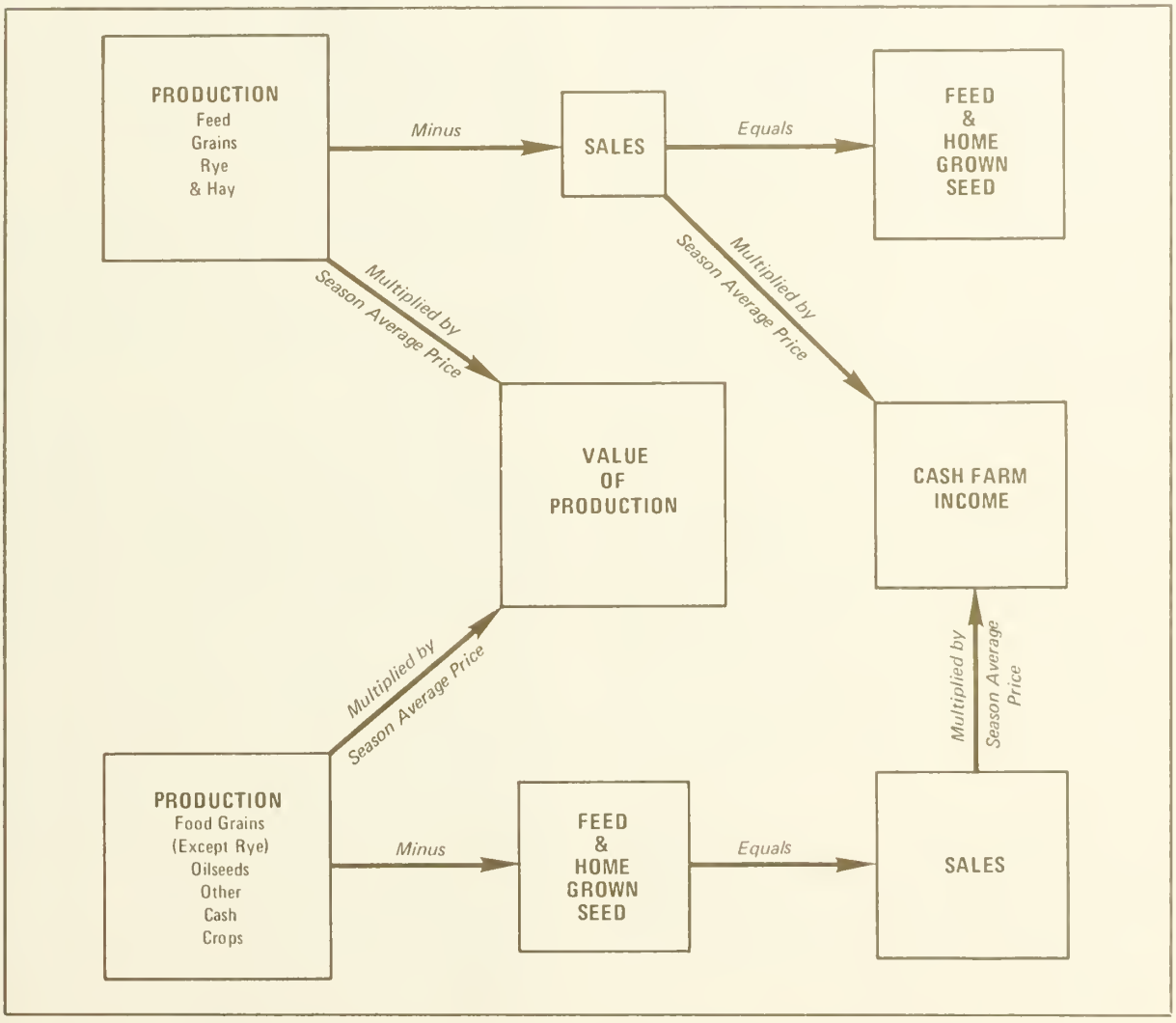


Figure 3.—The schematic chart depicts the two methods of estimating disposition of crop production and calculating values and cash farm income. (Size of the figures is not proportional to the amounts.)

The regression coefficient b is the only quantity whose numerical value is unknown. To minimize the arithmetic required, the approximate estimate of b is computed as follows: The sample plants are separated into two groups on the basis of size (capacity). The average capacity and stocks per plant are computed separately for each group of plants. The ratio of the differences of these averages is an estimate of b.

Both the regression and the ratio-to-capacity methods are based on the assumption that the relation of stocks to capacity for plants in each size group is the same for reporting and nonreporting plants. To the extent that this assumption is not valid, neither method completely adjusts for the selectivity in the returns. The off-farm stocks estimates are established on a State-by-State basis, with the U.S. totals obtained by summing the data from the individual States. Individual State off-farm stocks are not published separately for those States in which one firm holds a high proportion of the stocks and publication could divulge the holdings of an individual firm. Stocks of the crop for all States falling in this category are combined and shown in an "unallocated" total for the United States.

FARM DISPOSITION

An annual report covering farm disposition and value of principal field crops is issued each May; it contains preliminary estimates for the current marketing season and revised estimates for the preceding year. The report shows quantities sold and used as feed or seed on farms where grown.

These estimates of farm use and sales relate to the disposition of a given year's production on producting farms regardless of when the disposition occurs. Sales include all amounts sold, whether to another farm or to a dealer or delivered to the Government under unredeemed loans and purchase agreements. Estimates of quantities fed to livestock and poultry include only that portion fed on the farm where produced. Grain and hay purchased are not included.

For certain crops, estimates are made of the total seed required for planting next year's crop. A further breakdown is made for some crops to show seed used on farms where grown. The difference between total seed and seed used on farms where grown represents purchased seed.

Estimates of quantities sold are established for the principal feed grain crops and rye, and the remainder—production less sales—is the estimate for the amount used as feed and seed. Disposition estimates for hay cover both quantity sold and used on farms where produced. For soybeans and food grains, except rye, the quantities used on farms are estimated, and the difference between these and production is the amount sold. For certain commodities, such as tobacco (for which there is practically no farm use) the entire production is shown as sales.

Prior to 1961, disposition estimates related to both equivalent production of all corn and production of corn for grain. Equivalent all-corn production estimates were discontinued in 1961, and thereafter relate only to production of corn for grain.

Preliminary sales data for feed grains and hay are obtained about March 1 from a general mail survey in which farmers are asked the amount produced, sold, and to be sold. Quantities sold are converted to percentages of production and regression charts are used to interpret the survey indication of sales.

In analyzing the estimates, quantities sold are compared with changes in production or supplies by means of regression charts. Changes in the quantity of grain held under Government ownership or loan must be considered, since such changes may alter the usual relations between supply and sales. Livestock numbers, prices, and supplies of other feed are additional factors considered when setting these estimates.

Preliminary estimates on wheat fed on farms where produced are based on February 1 indications from a general mail survey in which producers are asked questions on production and the amount fed. Regression charts are used to interpret the indicated percentage of production and arrive at the current year's estimate.

The preliminary estimates of soybeans fed are developed by regression charts relating supply or production to the amount used for feed. Preliminary estimates of the amounts of soybean and rice seed used are based on March 1 prospective planting intentions, the usual seeding rates, and the usual percentage of seed used on farms where grown. The estimates of the amount used for feed

and as homegrown seed are subtracted from production, and the remainder is considered as sold.

At the end of the marketing season, surveys are made for several crops to obtain a more precise measurement of sales and other methods of disposition. Questionnaires are mailed to lists of producers of each commodity. States participate in these surveys annually, biennially, or less frequently; the time interval depends on the stability of the disposition pattern and the importance of the State in total production of the crop.

These end-of-season surveys obtain basic data from individuals who report for their own farms on production, carryover stocks, and purchases—the items that make up total supply. The disposition of this supply is broken down by the amount used for seed, feed, food, sales, and the end-of-season carryout stocks. Questions about acreage planted and seed used are asked to determine average seeding rates.

Revisions are based on end-of-season surveys and on check data, such as reports of processors, market receipts, and records of handling or shipments.

Monthly Sales

Monthly marketing percentages for major U.S. grain crops are published in the December Crop Production report and the May Field Crops Disposition and Value report; cotton marketing data are released in the December and May Crop Production reports.

Surveys of monthly grain purchases by mills, elevators, and dealers who buy direct from farmers are made after July 1 for small grains and after October 1 for corn, sorghum grain, soybeans, and other late-harvested crops. The purchases are summarized by months and converted to percentages of total annual receipts. These percentages are evaluated on time-series graphs maintained for each commodity, showing seasonal marketing patterns for several years. Rail shipments, receipts at principal markets, cotton classing data, and ginnings reported by the Bureau of the Census provide additional indications of monthly sales.

Tabulations of dealer purchases are generally more reliable than monthly sales reported by farmers, since the dealer universe is relatively small and such a survey covers a larger proportion of the crop sold. However, for hay and some other crops, monthly sales information obtained from farmers is the only data available.

Value of Sales and Production

The value of sales of each crop is the estimated quantity sold multiplied by the season average price per unit of measure. Similarly, value of production is calculated by multiplying total production by the season average price received for the portion sold. For most crops, the season average price is derived by weighting midmonth prices by the quantities sold each month of the crop marketing season. For price-supported crops, an allowance is made for unredeemed Commodity Credit corporation loan and purchase agreement deliveries valued at the average loan rate.

FEED GRAINS

Yield and production forecasts of feed grains —corn, oats, barley, and grain sorghum—are based on monthly general mail surveys of producers, and, for corn, on objective yield data. The full program is similar to that outlined earlier for all field crops. Monthly production forecasts are made July, August, and September for barley and oats; and August, September, October, and November for corn and grain sorghum. The end-of-season acreage, yield, and production estimates for barley and oats are first published in the December Crop Production report. Season-end estimates for corn and sorghum are published in the Crop Production Annual Summary in January.

Barley

Barley estimates are made for 36 States, although nearly one-fourth of the crop is produced in North Dakota. Monthly production forecasts, including acres for harvest and yield per acre, are made in 18 States that account for about 95 percent of the U.S. production. The 18 limited-forecast States prepare a forecast only for July 1.

Many States plant barley in both the fall and spring and the indications from fall and spring surveys are combined to obtain indications of all barley seeded. The monthly yield forecasts are

based on mail surveys of crop reporters.

Barley variety surveys, financed partly by the Malting Barley Improvement Association, are conducted annually in 10 States. In recent years, domestic use of barley as malt has trended upward, while livestock feed usage has stabilized.

Corn

The corn estimating program includes indications of the crop planted for all purposes; harvested acres, yield, and production for grain and silage; and acres harvested as forage. Corn forage includes acreage hogged, grazed, or cut dry and fed without removing the ears from the stalk.

Estimates of acreage for harvest as grain are made for July and August. Corn-for-grain forecasts of yield per acre and production are made initially in August in 41 States. New forecasts are made in September, October, and November for 19 States that account for approximately 95 percent of the U.S. crop. The August forecast is carried forward unchanged in succeeding forecasts for the 22 limited-forecast States.

Objective yield measurement of corn

Corn objective yield surveys are conducted monthly during the growing season for 19 major States. Sample plots are carefully located and marked in each sample field. Stalk and ear counts and measurements are made monthly in the plots.

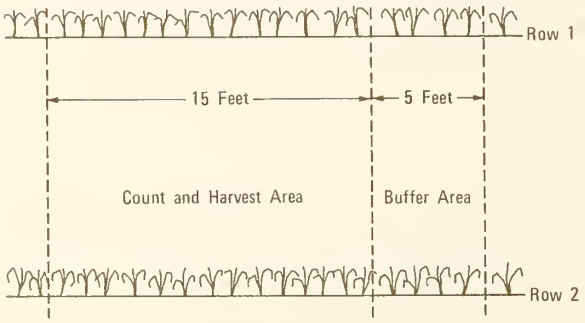


Figure 4.—Diagram of layout of a sample plot for objective measurement of corn yield.

The two components used in forecasting yield from objective measurements are number of ears and weight per ear. Early in the growing season it is necessary to forecast each of these components. Two models are used to forecast number of ears. Both use linear-regression equations relating 3 years of historical data of early counts to number of ears finally harvested. One model forecasts number of ears, based on stalk counts; the other uses the ratio of stalks with ears to total stalks for predicting the ratio of ears and ear shoots present to the expected number of ears at harvest.

The models, developed State by State, depend on maturity of the corn at the time the sample is visited. For samples in the earliest stages of development, only the first model (using stalk count) is used; both models are used for fields in a more advanced stage of maturity.

The weight-per-ear forecast is based on two models that relate ear measurements to final ear weight for samples with ear development sufficiently advanced. One model is based on average length of kernel row in five sample ears. The other model uses the average length measurements made over the husks for ears in one row of the plot. The two predictions of ear weight are then weighted together, using weights based on their respective coefficients of determination, R^2, which reflect the precision expected for each of the two models. For samples in the early stages of development, the 3-year historical average ear weight for the State is used instead of the forecasted ear weight.

At maturity, the corn in the sample plots is harvested, counted and weighed to determine the yield of the sample. Two of the harvested ears are selected at random to determine moisture content and shelling percentage. After harvest, separate sample plots in the same sample fields are gleaned to indicate harvesting loss. Estimates of these losses are computed and subtracted from the biological (gross) yield determined from the harvested plots to determine net yield per acre. A bushel of corn is defined as 56 pounds of shelled grain with 15.5-percent moisture content.

Indications for forecasting corn yields are also obtained on the monthly general mail surveys of volunteer crop reporters in all States. Condition of the crop or probable-yield data are collected, depending on the maturity of the crop. The initial forecast made for limited-forecast States is based solely on these mail survey indications.

Oats

Oats continue to be second in production to wheat as a small-grain crop, even though output has declined sharply from the peak crop in 1945. SRS prepares estimates for oats grown in 40 States.

Forecasting and estimating procedures for acreage, yield, and production generally follow those discussed earlier in this chapter. However, since seeding of oats occurs in both fall and spring in some States, it is necessary to combine acreage indications from fall and spring surveys to obtain an indication of all oat acreage.

Yield forecasts are based on data from the monthly general mail surveys of volunteer crop reporters. Forecasts of production are made July, August, and September in 21 States accounting for 96 percent of production, and only in July for 19 limited-forecast States. The first forecasts are based on reported condition, except in some Southern States, which use the probable-yield indication in July. Both condition and probable-yield indications are extensively used in August, but by September, States use only the probable-yield indications.

Sorghum

Farmers in the Southern and Central Plains States produce most of the Nation's sorghum. Texas alone produced over 40 percent of the crop in 1974.

Eleven of the 23 States in the estimating program represent about 97 percent of the U.S. production and prepare monthly forecasts from August through November. The remaining limited-forecast States prepare only the August forecast, which is carried forward unchanged in the remaining monthly forecasts. The forecasts are based on mail surveys of crop reporters.

The August yield forecast primarily reflects interpretation of conditions reported by farmers, with allowances for yield trend. The Texas estimate uses reported probable-yield data for August. States preparing September 1 forecasts use both the condition and probable-yield charts, except in Texas, where crop maturity is so well advanced that only probable-yield indications are used. The 11 monthly forecast States use reported probable-yield indications exclusively for October and November.

FOOD GRAINS

The statistical program for food grains includes acreage, yield, and production indications for wheat, rye, and rice, and is similar to programs discussed earlier for other field crops.

For winter wheat and rye, a seeded acreage estimate is published in December prior to the year of crop harvest. These estimates are based on indications from the December enumerative survey and the fall acreage and production mail survey. National acreage levels are established by the Crop Reporting Board in the same way as outlined for spring-planted crops in this chapter.

Production forecasts are first published in December for winter wheat, in July for spring wheat and rye, and in August for rice. The end-of-season estimates for these crops are published in the December Crop Production report and the Crop Production Annual Summary.

Winter Wheat

About three-quarters of all wheat produced in the United States is the winter-wheat type. Of the 42 States included in the winter-wheat program, 24 States accounting for about 97 percent of the crop make forecasts in December and from May through August. A September forecast also is issued for Montana, Idaho, Washington, and Oregon, with the August forecast carried forward for other States. For the 18 limited-forecast States, forecasts are made in December, May, and July.

Winter-wheat condition reported by volunteer crop reporters in a general mail survey provides the principal basis for forecasting yields per seeded acre in December. The May through September forecasts are based on objective yield surveys, and condition or probable-yield indications are obtained from the monthly general mail surveys. Regression and multiple-regression charts are used in most States to interpret condition and probable-yield indications from the mail surveys.

Winter-wheat objective yield surveys are conducted in 15 States that account for 90 percent of the total crop. The mail surveys provide the sole basis for the forecasts in 27 States with lower

production.

Objective yield surveys begin May 1 in 11 States and June 1 in Idaho, Michigan, Montana, and South Dakota. The monthly surveys are continued through the season until the sample fields are harvested.

Sample fields are selected from the December and June enumerative surveys, except in Texas, where the sample is selected from a fall probability acreage and production survey. Two sample plots are laid out in each selected field. Each plot includes three rows 21.6 inches long. Field enumerators use U-shaped frames measuring 21.6 inches between 4-inch arms to lay out the plots. Stalk and head counts are made monthly throughout the season and samples of heads are clipped and sent to State laboratories for analysis as the crop nears maturity.

Objective yield measurement of wheat

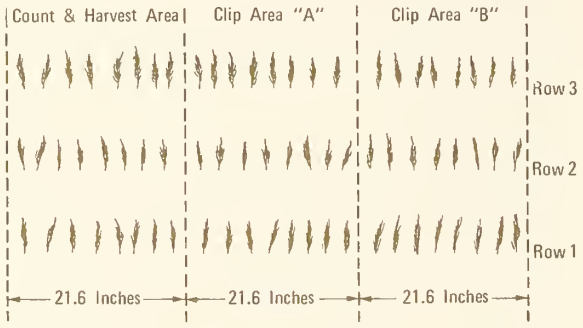


Figure 5.—Diagram of layout of a sample plot for objective measurement of wheat yield.

Two statistical models are used for forecasting each of the yield components (head weight and number of heads). These regression models are based on the relation between counts and measurements of plant characteristics made at selected times during the growing season and actual counts, measurements, or weights made for identical sample plots at harvest.

Early in the season, the major independent variable used to forecast expected number of heads is the stalk count. Later, the count of stalks 10 inches tall or taller and the number of heads emerged or in the boot stage of development provide independent variables for predicting the number of heads expected at harvest. A count of spikelets provides the first indication of head weight. Prior to the formation of the heads in the boot, historical 3-year averages are used for head weights. When the wheat plant reaches the late stage of development, the actual count of kernels is used for predicting final head weights. The coefficient of determination is computed for each regression model and is used to weight the two forecasts together for each component.

The same plots are harvested when the field reaches the hard dough or ripe stage, the number of heads is counted, and average grain weight per head and moisture content are determined for each sample. The number of heads is expanded to heads per acre, and grain weight per head is adjusted for moisture content. These actual yield components are then expanded by the model to determine final biological (gross) yield per acre. Harvesting losses determined by sample gleanings are then subtracted to arrive at net harvested yield. A bushel of wheat for yield forecasts and estimates weighs 60 pounds at 12-percent moisture content.

Durum and Other Spring Wheat

About one-quarter of all wheat produced in the country is planted in the spring, mostly in the West North Central and Northwestern States. Durum wheat represents about one-fifth of the total spring crop and estimates are made for five States, including one limited-forecast State. Estimates for other spring wheat are made for 12 States, 6 of which account for 99 percent of the crop. The remaining are limited-forecast States.

Monthly production forecasts are published in the July, August, September, and October Crop Production reports. The July forecasts for seven limited-forecast States are carried forward without change in the succeeding forecast reports.

The yield forecasts are based on the objective yield survey and on condition or probable-yield indications from the monthly general mail surveys. Objective yield surveys are conducted in five States raising about 95 percent of all spring wheat. Sample fields are selected for the June enumerative survey—about one-third of the samples are durum and the rest other spring wheat.

The spring-wheat objective yield procedures are similar to those discussed earlier under winter wheat.

Rice

Areas of riee produetion in the U.S. inelude the Coastal Prairie of southwestern Louisiana and southeastern Texas, eastern Arkansas, northwest Mississippi, southeast Missouri, and the central valleys of California, particularly the Saeramento Valley.

Monthly yield and production forecasts are made from August through November in these States. The rice estimating program is similar to that of most fall-harvested crops. Indieations from the general mail surveys discussed earlier are supplemented by speeial rice grower surveys. A probability mail survey of rice growers is conducted eaeh fall to obtain more preeise estimates of aereage, yield, and produetion by length of grain. Produetion estimates by length of grain are published in the Deeember Crop Production report. Revisions made the following year are based on surveys of mills to obtain marketing reeeipts of riee by State of origin.

Rye

Most rye is produced in the Northern and Central Great Plains; South Dakota, North Dakota, Minnesota, and Nebraska produee about 60 pereent. Only one-third of the planted rye aereage is harvested for grain; the rest is used as pasture or cover erop.

Rye estimates are made for 29 States, 6 of whieh are limited-foreeast States. Estimates of seeded aereages are published in Deeember preeeding the year of harvest. Aeres for grain harvest and the first foreeast of produetion are included in the July Crop Production Report. The seeond and final rye produetion foreeast of the season is in August. Reported eondition and yield indieations from the monthly general mail surveys of volunteer erop reporters provide the basis for the yield foreeasts.

Hay

The statistical program for hay is similar to that for other field erops, exeept that planted aereage estimates are not made. Estimates for all States exeept Hawaii are published for alfalfa hay, other hay, and all hay. Produetion foreeasts are made in August and Oetober for the largest producing States and in August only for limited-foreeast States. Alfalfa estimates and foreeasts are prepared for 44 States, ineluding 16 limited-foreeast States. Forty-eight States are included in the "all other hay" program, ineluding 12 limited-foreeast States.

The yield-per-aere eomponent of the hay produetion foreeasts is based on eondition of the erop and probable yield, ineluding all euttings reported on monthly general mail surveys. The final yield data are based on information on total acres harvested and total produetion reported by individual farms.

OILSEED CROPS

Monthly produetion foreeasts are made from August through November for soybeans, peanuts, and flaxseed; eottonseed produetion is estimated from August through January. Aereage, yield, and produetion estimates for these oilseed erops utilize the same statistieal procedures outlined earlier in this ehapter.

Soybeans

Soybeans estimates relating to aereage planted for all purposes, harvested aeres, yield, and produetion normally are made for 30 States that aeeount for virtually all the U.S. crop. Production foreeasts are made monthly from August through November for 18 major States. For 12 States, a limited foreeast of produetion is made in August and earried forward in the sueeeeding months.

The planted aereage estimate is based on the same type of survey indieations as the other major field erops. Sinee eonsiderable aereage of soybeans often remains to be planted when the June enumerative survey is eondueted, the aereage estimate in the July Crop Production report may refleet a large proportion of planting intentions. These aereage survey indieations are updated and aetual plantings are reflected in the August Crop Produetion report.

Yield foreeasts are based on mail survey reports of probably yield and objeetive yield survey data.

Currently, 14 States produeing over 90 pereent of the U.S. erop are in the soybean objeetive yield measurement program. Sample fields are visited for the first time for the August 1 fore-

cast in six North Central States that account for about two-thirds of total production. All 14 States are visted for the September 1 forecasts. Sample plots consisting of two rows 3 feet long are carefully located in each field selected. Counts of plants, blooms, pods, and lateral branches are made in the plots monthly thereafter.

Objective yield measurement of soybeans

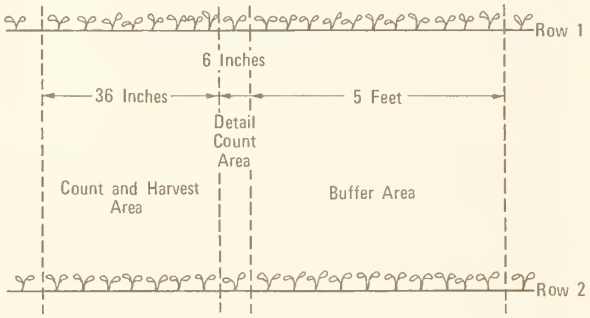


Figure 6.—Diagram of layout of sample plot for objective measurement of soybean yield.

The gross yield is forecast for each sample plot on the basis of plants per unit area; pods with beans per plant; and weight of beans per pod with beans. Harvesting loss is subtracted from gross yield to arrive at the net yield.

The plants per unit are counted, but pods with beans and weight per pod must be forecast during the growing season. The number of pods per plant is forecast by using one or more of the following counts, depending on plant maturity: (1) Main stem nodes, (2) total fruit (blooms and pods), (3) pods only, (4) main stem nodes with fruit, (5) lateral branches with fruit, and (6) pods with beans per plant. Prior to harvest, the average weight per pod is forecast, based on historical pod weights. At maturity the pods are actually stripped from the plants in the units and weighed to determine final outturn. Gleanings of sample plots following farmer harvest are made to determine harvesting losses, which are subtracted from the biological (gross) yield to determine net yield. Soybean yield is estimated from yield data in bushels equivalent to 60 pounds of beans at 12.5-percent moisture content. Forecasts for States not having data derived from objective measurement of yield are based on the monthly general mail surveys.

Flaxseed

Estimates and forecasts for flaxseed are published for North Dakota, South Dakota, Minnesota, Texas, and Montana, using procedures discussed at the beginning of this chapter.

Production forecasts begin with the August Crop Production report and are updated in September and October. In Texas, flaxseed harvest is usually completed in early June; therefore, the August estimate is carried forward in subsequent reports. Montana, a limited-forecast State for flaxseed, prepares only an August forecast that is carried forward the next two months. End-of-season acreage, yield, and production estimates for all States appear in the Crop Production Annual Summary.

Production forecasts are based on indications from the monthly general mail surveys. Early yield forecasts are based on regression analysis of crop conditions indicated by crop reporters. Later forecasts rely on probable-yield indications from reporters.

Flaxseed exports and mill crushings provide a check of production estimates.

Peanuts

Basic methods for estimating peanut acreage, yield, production, disposition, and value are similar to those for other crops discussed earlier in this chapter. Production is forecast from August through November for the seven major States that raise 98 percent of the U.S. crop. For three limited-forecast States, forecasts are made August 1 and carried forward from September to November. Early yield forecasts are based on reported conditions, while probable-yield indications are used later.

Considerable supplemental check data are available for use in the peanut estimating program. Allotted acres, certified acres, and final marketings are obtained by the Agricultural Stabilization and Conservation Service in the administration of the peanut program, and marketing inspection data are secured by the Agricultural Marketing Service.

Revised peanut estimates for the preceding year are published in the April Crop Production report.

A monthly Peanut Stocks and Processing report is issued by SRS. Under provisions of the Peanut Statistics Act of 1938, handlers of raw peanuts, other than the original producers, are required to submit monthly reports. The universe includes approximately 100 shellers and crushers, 325 commercial processors, and 200 warehousemen. Principal items covered in these reports are peanut inventories, disappearance, millings, production of shelled peanuts and roasting stock, quantities of peanuts used in selected edible products, crushings, and production of crude peanut oil and meal.

Cottonseed

Only total U.S. cottonseed production is forecast during the growing season. These forecasts are derived by multipling the 3-year average lint/seed ratios by the forecast cotton lint production for each cotton State and summing to a national total. Receipts at mills provide an excellent check on total production once the crop has been processed.

OTHER CROPS

Cotton

Cotton production is concentrated on the High Plains of Texas and Oklahoma, in the delta area along the Mississippi river, and in the irrigated valleys of Arizona and California. Separate estimates are made for upland (short staple) and American Pima (extra long staple) cotton. Upland is the dominant type and makes up 99 percent of all cotton. American Pima is grown primarily in Texas, New Mexico, and Arizona.

Production forecasts for 14 major States begin August 1 and continue monthly through January. A production forecast is made for August and carried forward monthly until the January final estimate for five limited-forecast States, which account for less than 1 percent of the U.S. crop.

Three independent sources of data are used in making the monthly production forecasts: objective yield surveys, monthly general mail surveys, and Bureau of the Census ginners' reports.

About 2,500 cotton fields are selected from the June enumerative survey for the 14 major States. Sample plots, each containing two rows 10 feet long, are placed in each field selected. Counts are made of plants, squares, blooms and bolls for forecasting purposes.

Objective yield measurement of cotton

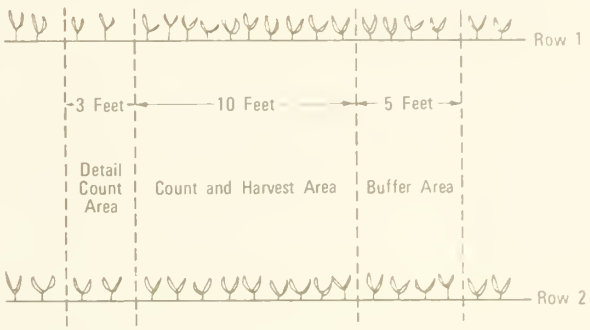


Figure 7.—Diagram of layout of sample plot for objective measurement of cotton yield.

Yield is forecast for each sample and is derived by multiplying the historical average lint/seed ratio by the expected number of large bolls and the expected weight per boll. Then the expected harvest loss is subtracted. The expected number of large bolls is estimated by using both a survival model and a multiple-regression model. Both use the following formula:

$$\hat{Y} = a + bx_1 + cx_2 + dx_3$$

where

$\hat{Y}$ = Forecast number of large bolls
x_1 = Number of burrs, large open bolls, and large unopened bolls
x_2 = Number of small bolls and blooms
x_3 = Number of squares

For the survival model, the coefficients *a, b, c,* and *d* are developed from historical survival rates at various stages of maturity of squares, blooms, small bolls, and large bolls. Three of the coefficients (*b,c,d*) are average survival rates and *a* is the average number of large bolls expected from fruit not set. The coefficients for the multiple-regression model are determined by least squares procedures. The forecasts from the two models are weighted by the reciprocal of their forecast errors.

One model is used to forecast weight per boll. Early in the season, the historical average is used until 20 percent of the projected number of large

bolls have been picked. Then the following forecast model is used:

$$\hat{Y} = W_1 (a + bx_1)$$

Where

$\hat{Y}$ = forecast boll weight
W_1 = observed boll weight
X_1 = ratio of number picked to number of large bolls expected
a,b = coefficients

The forecast of harvest loss prior to completion of harvest is based on historical averages. Actual harvesting loss is determined immediately following harvest, based on gleanings of sample units.

Farmers report condition and probable yield for their locality the same as for other crops on the monthly general mail surveys. In addition, they report expected production for the current year and production for the preceding year for their individual farms. These indications are analyzed by using regression charts.

The ginners' indications provided to SRS by the Bureau of the Census are used in months when ginners can accurately forecast the number of additional bales expected to be ginned. In recent years, with the practice of later ginnings, this indication from the Census Bureau is used primarily for the November, December, and January forecasts in most States.

The average bale weight reported by ginners is also used in forecasting cotton production in 480-pound net weight bales. A cross-State ginning factor (cotton grown in one State and ginned in another) is also used to adjust the indicated cotton ginned as enumerated by the Census Bureau.

To summarize, the components of the ginners' indicated expansion are:

$$Y = \frac{\frac{A \times B}{480} \times C}{D}$$

Where: Y = indicated production in 480-pound net weight bales
A = average net weight per running bale
B = cross-State ginning percentage
C = estimated bales ginned to date
D = Board-estimated percentage ginned to date

As shown above, there are always from two to five indications of production to appraise when making a monthly forecast. Bringing the indications into a composite estimate is an important phase of the estimating procedure. The regression graphs with their R^2 values are a valuable tool in deciding the best indications for different months of the year.

Tobacco

Soil types, topography, climate, curing methods, and other factors have led to 6 principal classes and 21 types of tobacco grown in this country. Flue-cured accounts for about 60 percent of the output, but type 31 or burley is the most widely grown and represents about 25 percent of the tobacco crop. Tobacco statistics are available by States since 1866, and estimates by types and classes since 1919.

Estimates are made for tobacco acreage, yield, production, price, and value by major classes and types. Production forecasts for flue-cured are made from July through November. Forecasts are made for all other types monthly, from August to November, except burley, which extends through December. The Crop Production Annual Summary in January carries the preceding year's production estimates for all types of tobacco. The estimates are subject to revision in May for all types except Maryland 32, which is reviewed the following August. These revisions are dependent on marketing data from the Agricultural Stabilization and Conservation Survey (ASCS) and the Agricultural Marketing Service (AMS).

Production forecasts are based on condition and probable-yield indications from the monthly general mail survey of volunteer crop reporters. Regression analysis similar to the procedures described earlier in this chapter is used to interpret these indications.

Burley indications obtained by mail surveys in Kentucky are supplemented by an objective yield survey of sample fields identified in the June enumerative survey. In these sample fields, randomly selected plots are marked for plant counts, and leaf measurements, counts, and weights. Burley tobacco hanging in the barn is stripped and weighed to obtain a final objective yield indication.

The marketing season for tobacco begins in

July with the flue-cured crop and ends in June the following year with Maryland type 32. Approximately 95 percent of all tobacco production is sold through auction markets.

Sugar

Sugar beet and sugarcane estimates are made for acreage (planted and harvested for beets, harvested only for cane for sugar and seed), yield, production, price, value, raw sugar, molasses, and pulp. Raw and refined sugar production and the yield of raw sugar from a ton of cane are reported at the end of the year.

The program of estimates from planting intentions to the end of harvest follows the pattern of other field crops except for sugarcane, which is not included in the Prospective Planting reports.

Planted acreage of sugarcane is not estimated, because of the variation in the growing season and the practice of harvesting more than one crop from each normal planting of seed. After the cane is cut, it grows again from the established root system.

Data relating to acreage only are published in Prospective Plantings for sugar beets and the July Crop Production report for both crops. Acreage, yield, and production forecasts are published monthly from August through November.

Procedures used in estimating sugar generally follow those of other field crops, although considerable data are obtained from sources other than grower surveys, such as sugar companies that contract acreage and process the crops. Hawaii cane estimates are based on information obtained from the Hawaiian Sugar Planters Association. Sugar company data are obtained on special questionnaires from home offices of the firms, and these are the primary basis for acreage estimates. Regular producer indication of condition and probable yield and sugar company expected yields are used in forecasting production during the growing season. The forecasts of sugarcane combine those for sugar and for seed; separate estimates are made for the two at the end of the season.

The preliminary annual estimates are published in the Crop Production Annual Summary and final revisions in the June Crop Production report, based on final data provided by sugar companies.

Broomcorn

Broomcorn estimates are currently made for Colorado, Oklahoma, New Mexico, and Texas, reflecting acres for harvest, yield per acre, and production. Forecasts are made August 1 and September 1, and end-of-season estimates are released in the Crop Production Annual Summary.

A mail survey of a list of broomcorn growers is the primary source of information. Acreage estimates are based primarily on ratios to land and current/current "identical" percentage changes from the previous year. Primary indications for the forecast of yield and production are grower reports on condition and probable yield per acre.

Mint for Oil

Estimates of acreage and production for peppermint and spearmint combined began in 1929, with separate estimates established in 1935. Peppermint accounts for about three-fourths of the total mint acreage.

The majority of the world's supply of peppermint and spearmint oils comes from mint grown in Indiana, Michigan, Wisconsin, Idaho, Oregon, and Washington.

A preliminary acreage estimate for the current year is published in the June Crop Production report. Monthly forecasts of acreage, yield, and production of peppermint and spearmint are released in August and September. The end-of-season estimates included in the Crop Production Annual Summary are subject to revision the following June.

Indications for preparing most estimates are obtained from mail surveys or personal enumeration of mint growers. Buyers, brokers, and other key contacts provide valuable check data for estimating mint acreage and production.

Hops

Estimates of hop acreage, yield, production, and value date back to 1915. Data on stocks were first collected in 1937 and became part of the program of estimates in 1947.

The program includes production forecasts during the growing season from August through October. Estimates of production, acreage, and yield are included in the Crop Production Annual

Summary. Farm disposition, price, and value estimates are released each May in the report, Field and Seed Crops—Production, Farm Use, Sales, and Value. The hops stocks held by brewers, dealers, and growers are estimated in March and September.

Estimating procedures for hop are similar to those used for other field crops, incorporating reported acreage, condition, and yield data. A comprehensive list of producers' names and addresses is maintained by the State Statistical Office in California, Idaho, Oregon, and Washington. These producers are surveyed monthly by mail during the growing season. Reported crop condition and indications of probable yield per acre are obtained from the mail surveys. Acreage estimates are based on current historical percentage change survey indications. In addition, a complete enumeration of acreage is obtained from growers and dealers. Close liaison is maintained with the Hop Administrative Committee and buyers or dealers. These sources and inspection records provide the basis for determining final production.

Questionnaires sent to growers, dealers, and brewers ask for the quantity of hops on hand March 1 and September 1. Estimates are based on complete enumerations obtained by first and second mail requests and followup telephone calls. Stocks are identified by year of growth.

Dry Edible Beans and Peas

The program of estimates and forecasts for dry edible beans and dry edible peas follows the pattern of other field crops, beginning with the Prospective Plantings report. In addition to the usual estimates provided for field crops, dry bean production estimates by class are included in the December Crop Production report. Dry pea production estimates by class are shown in the Crop Production Annual Summary issued in January. The program for beans includes 15 States, and that for peas, 4 States.

The bean estimates exclude seed bean produciton, and the pea estimates exclude Australia winter peas. Estimates of wrinkled seed peas are reported in the Crop Production Annual Summary.

Information on acreage planted for dry edible beans and dry edible peas is obtained in general surveys and is supplemented by surveys of seed dealers to obtain data on the volume of seed distributed to growers.

The initial forecast of harvested acreage, yield, and production is made August 1 for all States. The final forecast for dry edible peas is made September 1 for the four States. Monthly forecasts of dry edible beans are made for September, October and November in nine major States. The August 1 forecast is carried forward monthly for six limited-forecast States.

The monthly yield and production forecasts are based on reported locality condition and probable yields from the monthly general mail survey and special surveys of known growers. Many States utilize the grower surveys to supplement the monthly general mail surveys.

The final end-of-season estimates of acreage, yield, and production are based on individual farm data on harvested acreage and production, by class, from surveys of growers. Useful production check data by commercial classes are also obtained from bean dealers.

SEEDS

Legumes, Grass, and Other Cover Crops

The seed estimating program includes alfalfa, red clover, tall fescue, timothy, lespedeza, crimson clover, ladino clover, orchardgrass, Merion Kentucky bluegrass, other Kentucky bluegrass, chewings fescue, red fescue, bentgrass, hairy vetch, and all ryegrass. Estimates for one or more seed crops are prepared in 33 States. States included in the program account for at least 95 percent of the total U.S. production.

Reports contain statistics on acreage harvested, yield per acre, production, farm and dealer carryover, imports and exports, if available, and total supply. Additionally, SRS provides disappearance data, prices received by farmers, and total value of production. Disposition estimates (percentage sold, quantity sold, and quantity used for seed on farms where grown) are published in May for alfalfa, red clover, lespedeza, and timothy seed. A report of dealers' stocks published in early August contains data on the amount of carryover by kind of seed held by dealers as of June 30.

Data for the production forecasts are obtained from growers after harvest gets under way, when they have some preliminary knowledge of probable outcome of the crop. Reports from shippers are also obtained at that time. The growers' and shippers' questionnaires are designed to supplement each other to provide indications of annual changes in acreage harvested, yield per acre, average date of beginning harvest, farm carryover of seed, and opening prices to growers.

Estimates of acreage, yield, production, price, and value of production are prepared for the seed crops in January following harvest. The publication includes the end-of-year estimates for those seeds for which forecasts were made earlier in the season, as well as the initial estimate for seeds not included in early-season forecasts. The January estimates are based on grower acreage and production surveys, both general-purpose and specialized seed questionnaires, and preliminary reports from cleaners. Producer lists are maintained by State Statistical Offices, since much of the seed production is highly localized on specialized farms.

The January estimates are preliminary and are revised in May when check data, such as final seed cleaner surveys, acreage and production totals of certified seed, and other data are available. At 5-year intervals, estimates are revised if necessary, based on final seed cleaner data, disposition data, and acreage and production information available from the quinquennial census of agriculture.

Dealers' carryover stocks as of June 30 are obtained annually from a mail survey of every known firm that normally carries over any appreciable quantity of seed. The questionnaire is designed to furnish a cross-check of seed owned or controlled by others but stored in the reporter's warehouses. These surveys cover more than 90 percent of the commercial stocks. This degree of completeness of coverage requires much followup effort by mail and telephone.

Vegetable Seeds

Vegetable seed surveys are made as of February 15 or June 30. The February survey covers final acreage and production for the preceding year and prospective acreage and production for the current year. Firms that produce their own seed or contract with growers provide the data for this report. Seed dealers are surveyed annually for the carryover of vegetable seed on June 30. These detailed surveys supply totals for 42 major kinds of vegetable seed and 250 separate subcategories. Both surveys are virtually complete enumerations. Nonrespondents to the current survey that had stocks or production in previous surveys are contacted by telephone to ensure completeness and year-to-year comparability. ■

Chapter 5

VEGETABLES, POTATOES, SWEETPOTATOES, AND MUSHROOMS

INTRODUCTION

The estimating program for fresh and processing vegetables includes cantaloups, honeydew melons, watermelons, strawberries, potatoes, sweetpotatoes, and mushrooms.

Estimates for commercial vegetables began with onions and cabbage in May 1914. By the close of 1916, statistical reports on fresh market vegetables had been expanded to cover acreage, yield, and production of cabbage, celery, onions, cantaloups, watermelons, and strawberries. Estimates of vegetables for processing also began in 1916 and covered sweet corn, peas, tomatoes, and cucumbers for pickles.

Prior to 1939, vegetable acreage and production estimates related to output in areas that produced commercial crops mainly for shipment to distant markets. The estimates did not include local production near consuming centers. Estimates from 1939 to 1968 included production in all areas except home gardens. Beginning with the 1969 crop, the definition of production was modified to include only the quantity sold or utilized. Exceptions to this definition are made for storage onions, potatoes, sweetpotatoes, and New York cabbage, which are defined as the quantity harvested from the field, thus including potential shrinkage and losses in storage.

The SRS vegetable program is divided into the fresh market and processing series (see table 3). State estimates for individual crops frequently include both.

The primary reason why SRS separates the fresh market and processing estimates is that production, marketing, and utilization practices differ considerably between the two, and different systems of data collection and estimating procedures are required. In addition, many crops, although botanically similar, frequently have distinct varietal types commonly associated with either fresh market or processing utilization.

The basic universe for obtaining statistics on fresh market vegetables is growers and shippers, who plan their activities around a generally continuous demand for these commodities. The statistical program is oriented to providing regular periodic information on available supplies throughout the growing season. A relatively short season is usually involved and growers often adjust their plantings or marketings in view of available supplies nationwide. It is therefore impractical to attempt a single crop-year estimate for many of these crops. Interim reports during the season on acreage and production for crops such as tomatoes, celery, and lettuce provide growers with a basis for making adjustments in their planting or harvesting intentions.

On the other hand, processing vegetables are estimated for a crop year, since they are most commonly grown under contracts in which producers commit the entire season's total output to processors. The processors are contacted for the data on acreage, production, and value of production needed for SRS estimates.

Commercial vegetable processing includes canning, freezing, pickling, and other treatments performed by the firms selling their output to the public. Vegetables used for commercial dehydration are included with fresh market estimates. Excluded are home and institutional processing.

Table 3.—Vegetable estimates by crops

Crop	Fresh market series			Processing series	
	In season	Quarterly	Annual	In season	Annual summary
Artichokes	● [1]		● [1]		
Asparagus	● [1]		● [2]		● [2]
Beets				●	●
Broccoli		● [1]	● [2]		● [2]
Brussels sprouts	● [1]		● [1]		
Cabbage		● [1]	● [2]	● [3]	● [2]
Cantaloups		●	●		
Carrots		● [1]	● [2]		● [2]
Cauliflower		● [1]	● [2]		● [2]
Celery	● [4]	● [1]	● [1]		
Cucumbers		●	●	●	●
Egg plant		●	●		
Escarole		●	●		
Garlic	● [1]		● [1]		
Green peas				●	●
Green peppers		● [1]	● [1]		
Honeydew melons		●	●		
Lettuce		●	●		
Lima beans				●	●
Onions	● [1]		● [1]		
Snap beans		●	●	●	●
Spinach		●	●	●	●
Strawberries	● [1]		● [2]		
Sweet corn		●	●	●	●
Tomatoes		●	●	●	●
Watermelons		●	●		

[1] Total production includes both fresh and processing.
[2] Separate estimates of fresh and processing production and value.
[3] Contract tonnage only.
[4] Monthly celery report, acres planted and acres growing (Florida, California, New York, Michigan, and Ohio).
[5] In-season estimates refer to the total crop, whereas quarterly estimates are limited to that portion of the crop marketed during the respective winter, spring, summer or fall quarter.

FRESH MARKET VEGETABLES, MELONS, AND STRAWBERRIES

The fresh market vegetable program consists of estimates for 19 major crops: Artichokes, asparagus, snap beans, broccoli, brussels sprouts, cabbage, carrots, cauliflower, celery, sweet corn, cucumbers, eggplant, escarole, garlic, lettuce, onions, green peppers, spinach, and tomatoes. Also included under the vegetable program are cantaloups, honeydew melons, watermelons, and strawberries. These crops, which are produced in 46 States, account for about 85 percent of the national output of all vegetables; California and Florida produce over half.

Prior to 1973, estimates for 12 seasonal groups were prepared on a seasonal basis, when harvest was most active. Because of overlap between seasonal groups, and the need to better approximate supplies available for a given period, the fresh market vegetable estimates were changed to cover four calendar quarters. The winter quarter includes the January, February, and March harvests; the spring quarter, April, May, and June harvests; the summer quarter, July, August, and September harvests, and the fall quarter, October, November, and December harvests.

Data Sources

A large portion of fresh market vegetable production is concentrated in areas climatically adapted to a specific crop. Personal visits by field representatives of SRS are made to collect information from marketing organizations, grower-shippers, and others on the number of acres planted, condition of the crop, yield, movement, and prices received.

In less concentrated areas or where there are a large number of producers, information on acreage and yield is collected by mail surveys of growers. Names of vegetable growers are obtained from acreage surveys, market managers, county agents, grower associations, and Government agencies.

Acreage Estimates

Each production estimate is composed of two elements—acreage and yield per acre.

Data on planted or harvested acreage are obtained in many States by nonprobability mail surveys. Farmers are asked to report their current year's acreage and the preceding year's acreage. Dividing the former by the latter gives the C/H (current-to-historical) ratio for the reporting farmers. Another indication is the C/C (current-to-current) ratio, which is obtained by comparing the acreage reported by the farmer for the current year with acreage actually reported by the same farmer at the time of the preceding year's survey. The results from the above calculations are then interpreted by use of a regression chart. The indication from the graph reading is multiplied by the previous year's Board acreage to obtain the indicated current estimate of acreage. In the major vegetable-producing States, acreage surveys consist primarily of a complete enumeration of all growers.

For seven crops having seasonally identifiable planting periods (cabbage, cantaloups, celery, escarole, honeydew melons, tomatoes, and watermelons), estimates are made of acreage planted and to be planted for the entire season. Estimates of prospective acreage for harvest are then made at the beginning of each quarter. For the remaining quarterly program crops (snap beans, broccoli, carrots, cauliflower, sweet corn, cucumbers, eggplant, lettuce, green peppers, and spinach), only quarterly estimates of acreage for harvest are made at the beginning of each quarter.

Yield Estimates

Production estimates of fresh market vegetables are made after harvest is completed. Forecasts of yield and production are prepared only for onions and strawberries. These yield forecasts are based on both mail and enumerative survey data. The mail survey questionnaires ask that condition of the crop be reported as a percentage of normal, and/or probable yield per acre. Reported condition or yield data are correlated with historical final yield estimates.

At the close of each marketing season, growers are surveyed to determine actual acres harvested, yield, and production for all vegetables. In some cases this information is based on an enumeration of growers or growers' associations, county agricultural agents, or officials of irrigation projects by statisticians in the State Statistical Offices. In other cases a nonprobability sample mail survey is conducted to obtain the data. Survey indications are interpreted by means of regression charts to permit elimination of any consistent biases in the sample.

Production Estimates

Final production is a product of acreage times yield per acre. Various kinds of check data are evaluated to verify production. For example, Market News Service volume reports by State of origin or city of destination for many vegetables are compared with related historical data. These check data are converted to tons, using an average number of crates or bags per carlot and an average weight per crate or bag. Although truck and rail reports do not show movement of all fresh production, the year-to-year change in recorded data for a particular commodity and State or city may give a good indication of production.

The procedure used to estimate total production from recorded movement is illustrated in figure 8. Recorded movement (X axis) and final production of onions (Y axis) are plotted for the years 1964-73, and a regression line is drawn. A reported movement of 1,000,000 cwt indicates on the regression line a crop of 1,570,000 cwt. This indication is used, together with other chart read-

ings on yield per acre and indicated acreage, in establishing the estimates.

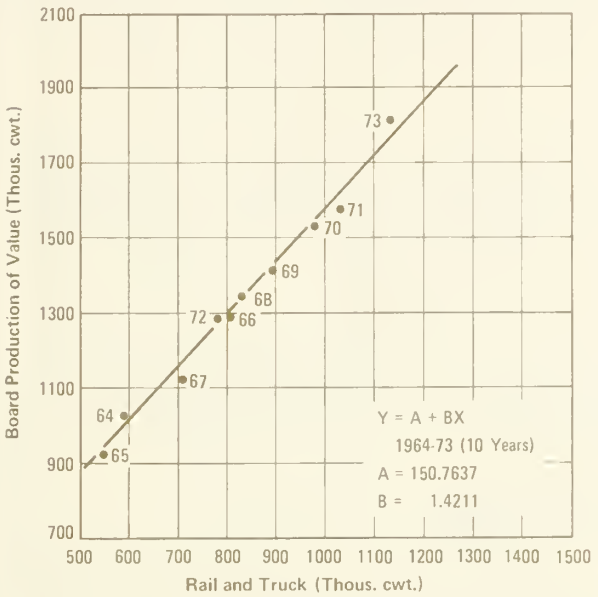


Figure 8.—Regression chart used to estimate total production of a State's spring onions, based on recorded movement.

State vegetable inspection records are used when available rather than truck and rail movements, since the inspection records are more complete. In States where production is checked as it leaves the State, border passings serve as excellent indications of fresh vegetable production. Auction market sales and cooperative association records also provide useful check data.

At 5-year intervals, the vegetable program is given a careful review. Estimates of crops no longer commercially important may be dropped from the forecast series and newly important ones added. This action has little effect on U.S. vegetable production estimates, however, since those crops dropped or added are relatively minor compared with the total U.S. production levels.

Prices

Prices received by farmers for fresh market vegetables are published monthly in Agricultural Prices. The prices published are defined as those received by growers at the most common point of first sale, which usually results in f.o.b. (free on board) prices. Estimates for the first half of the current month are usually based on Market News Service quotations and used for parity calculations. Prices for the whole month are generally obtained from surveys of growers, Market News Service quotations, and other sources. These prices are used in calculating preliminary values of production.

End-of-season surveys provide a basis for revision of monthly prices, which are published by States early the following year. Season average prices are obtained by weighting monthly prices by monthly marketings. The season average price computed from this series is applied to the fresh market production to arrive at the revised value of the crop produced.

Prices are obtained at the end of the year from processors for those crops which are also processed. The weighted average price which pertains to the entire year is applied to the processing portion of the crop to arrive at the value of production. In these dual-purpose crops, the value of production for fresh market is added to the value of processing production to arrive at the total value.

VEGETABLES FOR PROCESSING

Estimates of vegetables for processing are made for 13 principal crops: Asparagus, green lima beans, snap beans, beets, broccoli, cabbage, carrots, cauliflower, sweet corn, cucumbers, green peas, spinach, and tomatoes. Four of these—asparagus, broccoli, carrots, and cauliflower—generally are harvested for both fresh market and processing. Thus estimates for these are prepared for the total crop during the season, but at the end of the season separate production, price, and value estimates are made for each use.

In 1973, the estimating program for processed vegetables was modified by replacing the planting intentions reports previously released in early March and April with a release about April 1. Estimates of planted acreage, previously released in mid-May, early June, mid-June, and early July, are now issued as of July 1. Production forecasts are released midway in the harvest season: July 1 for green peas; August 1 for snap beans; September 1 for lima beans, beets, tomatoes, and sweet corn; and November 1 for cucumbers for pickles

The processing portion of the following crops is included with the fresh market in-season estimate: Artichokes, brussels sprouts, cabbage, celery, garlic, onions, green peppers, and strawberries. Among these crops, separate estimates of fresh market and processing are published at the end of the season for strawberries and cabbage only.

Data Sources

The basic universe used in obtaining data for estimates of vegetable processing is a complete list of all commercial processors. There are relatively few firms; however, there is extreme variation in size and type. Most firms report by returning mailed questionnaires. Followup mail requests, telephone calls, or personal interviews are used to obtain reports from nonrespondents. To avoid sending duplicate survey questionnaires to processors with operations in several States, the State Statistical Office in the State with the company headquarters obtains data for all the States and forwards them to each concerned State Statistical Office. When a complete enumeration cannot be obtained, estimates for nonrespondents are prepared and added to the enumerated data. Official estimates for the most part are summations of enumerated data by States for the entire universe. For States where publication would disclose a single processor's data, estimates are grouped together as an "other States" total.

Production Estimates

Forecasts of production are based on expected yield and estimated acres for harvest. A single forecast based on surveys of processors conducted near the midpoint of the harvest is issued for each crop, except cabbage for sauerkraut. For this crop an estimate of contract tonnage in June is carried forward until the annual summary issued in December.

Processors obtain most of their raw product through contracts with growers, but they also buy on the open market. Open-market purchases cannot be accurately determined until the end of the growing season. In some instances, processors also obtain vegetables directly from their own farms. At the end of each season, open-market purchases by processors are enumerated and added to production data reported by packers for contracted and owned-farm operations.

The December annual summary includes estimates of the amount of vegetables canned and frozen. Estimates are limited to national totals to avoid disclosure of individual operations.

Prices

The prices received by farmers for the processing vegetables are on the basis of an equivalent packinghouse door price. All payments to growers, plus the cost of materials and services furnished by processors and not charged to growers in getting the raw product to the processors' plant, are included. A processor worksheet available to the industry for calculating prices is shown in figure 9.

POTATOES

Estimates of Irish-potato production were first published in 1841; estimates of acreage and yield began in 1862. Until 1909, potato estimates were limited to acreage, yield, production, and prices, reported annually. Estimates of farm disposition and season average prices began in 1909, and monthly forecasts of potato production began in July 1912. Potato stocks reports were added in 1924.

More frequent and detailed statistical reports on potatoes were needed to cope with the problems of orderly production and marketing. As a result of this need stressed by leaders in the potato industry, Congress appropriated additional funds in 1956 to expand the work on potato statistics.

The entire program of potato estimates was reorganized in 1956 to better indicate production and supplies available during the various periods of the year. The new program included the first reports of stocks of potatoes in the States producing crops in the fall and an annual report of potatoes used in the expanding processing industry. Stocks of potatoes were estimated on the first of December, January, February, and March. Potatoes for processing are estimated annually and represent sales by product: Frozen french fries, chips, and shoestring potatoes; dehydrated; other frozen products; canned potatoes; other

FOR YOUR CALCULATIONS ONLY—KEEP FOR YOUR FILES

WORKSHEET FOR USDA REPORT ON "PRICES" (UNIT VALUES) FOR RAW FRUIT

Please use this worksheet in combining information on raw product costs for your company. Keep this information for YOUR PRIVATE RECORDS. Report ONLY the total on line 3. below on the USDA Report Form.

(Name of Fruit) _____ (Use) _____ (Year) _____ (State) _____

1. Weighted average cash price per *pay weight ton* = ... $_____

2. Additional field production costs per *pay weight ton not charged to grower* or in excess of grower charges, and not included in line 1:

	Per pay weight ton (dollars)
a. Planting stock, preparation, and planting	$_____
b. Weed, insect, and disease control (including cost of survey, equipment, application and materials)	$_____
c. Harvesting costs, including cost of operation, depreciation, repair and moving equipment, and labor procurement ..	$_____
d. Delivery cost to processing plant door, including payment to hired truckers, cost of company trucks, and grower hauling allowances	$_____
e. Container cost, including upkeep, losses, storage, and transportation	$_____
f. Field receiving station cost if located off plant premises (receiving, weighing, loading, etc.)	$_____
g. Inspection and grading costs. (Include only if used in purchase of raw product)	$_____
h. Icing and hydrocooling prior to delivery to plant	$_____
i. Association service fees if not deducted from grower payment	$_____
j. Other costs to processing plant door. Do not include brokerage, cost of fieldmen or other buying expenses	$_____
Average cost per pay weight ton not included in line 1. (total of lines a. through j.)	$_____

3. Total raw product "price" (value) per pay weight ton = ... $_____ (total lines 1. through 2.j.)

Place this value on USDA Report Form under "Price" (Value)

Figure 9.—Worksheet available to processors for calculating prices.

canned products, such as hash, stews, and soups; and starch and flour. Total sales are broken down into quantities sold for table stock, processing (as indicated above), livestock feed, and seed. In 1956, estimates of commercial production were discontinued and estimation of total production in all States was initiated.

A need to further improve the overall quality of potato statistics was recently recognized, and in 1971 Congress appropriated additional funds for that purpose. Probability sampling techniques in potato estimates were started in 1971 to improve the forecast for the fall crop. The effort involves data collection through the multiple-frame sampling technique for estimating planted acreage, and objective measurements for establishing yield per acre. At the same time, estimates for April 1 were added to the stocks program.

Table 4.—Program of reports on potatoes and sweetpotatoes

Date estimate	Winter potatoes	Spring potatoes	Summer potatoes	Fall potatoes	Sweet-potatoes
January	AH,F	I,R		S	
February	F			S	
March	F	AH	I,R	S,I	I
April		F		S	
May		F			
June		F			
July			AH,F		AH,R
August	D	D	F,D	R,AH,D	F,D
September			F		F
October	I,R			F	F
November				F	
December				F,S	
States:	California	Alabama	Alabama	California	Alabama
	Florida	Arizona	California	Colorado	Arkansas
		California	Colorado	Connecticut	California
		Florida	Delaware	Idaho	Georgia
		Louisiana	Illinois	Indiana	Louisiana
		Mississippi	Indiana	Maine	Maryland
		N. Carolina	Iowa	Massachusetts	Mississippi
		Texas	Maryland	Michigan	New Jersey
			Michigan	Minnesota	North Carolina
			Minnesota	Montana	South Carolina
			Nebraska	Nebraska	Tennessee
			New Jersey	Nevada	Texas
			New Mexico	New Hampshire	Virginia
			N. Carolina	New York	
			Ohio	North Dakota	
			Tennessee	Ohio	
			Texas	Pennsylvania	
			Virginia	Rhode Island	
			West Virginia	South Dakota	
				Utah	
				Vermont	
				Washington	
				Wisconsin	
				Wyoming	

I—Intentions to plant
AH—Acres for harvest
F—Yield and production
R—Revised acreage, yield and production—Published in Crop Production
D—Disposition and utilization of previous crop year—Published in Potatoes and Sweetpotatoes.
S—Stocks—Published in Potato Stocks

In the Red River Valley of North Dakota and Minnesota, estimates of the change in quality of potatoes in storage were initiated in 1974.

SRS production estimates by States are prepared for four seasonal quarters. The fall quarter accounts for about 85 percent of total U.S. production, the spring and summer quarters each represent approximately 7 percent, and the winter crop about 1 percent. Potatoes are grown in most States, but Idaho, Washington, and Maine produce over one-half of the crop.

All estimates are released in the monthly Crop Production report, except those dealing with disposition and stocks, which are issued in separate publications.

Acreage Estimates

Estimates of growers' planting intentions, acreage planted, and acreage for harvest, coupled with forecasts of yield, are the fundamental building blocks of this program. The general statistical procedures for developing this information are similar to those for other field crops.

In many States nonprobability mail survey questionnaires ask farmers to report their current year's acreage and their preceding year's acreage (as closely as they can remember this). Comparison of the former with the latter gives the C/H (current/historical) ratio. Another indication is the C/C (current/current) ratio, which is obtained by comparing the acreage reported by the farmer for the current year with the acreage actually reported by the same farmer at the time of the preceding year's survey. Because it lacks the memory bias often associated with the C/H ratio, the C/C ratio is the more reliable. Both indications are interpreted by use of regression graphs and enter into the formation of the acreage estimate.

Additional acreage data are developed for the fall crop through probability sampling techniques, including application of multiple-frame methods.

The list portion of the multiple frame is made up of approximately 8,000 producers in the 12 major producing States (Maine, New York, Pennsylvania, Michigan, Wisconsin, Minnesota, North Dakota, Colorado, Idaho, Washington, Oregon and northern California). These producers account for approximately 90 percent of the total fall acreage. Lists of producers are updated each year, using the latest available information on expected acreage. The lists are stratified according to size of producer and a systematic random sample is selected. Growers with large potato acreages are more likely to be selected than a grower with small acreage. Producers with 200-600 acres or more (depending on the State) are completely enumerated each year. Smaller growers are selected with a reduced frequency as low as one out of every seven. Current data from the selected growers is then expanded by the reciprocal of the probability of selection, which provides direct expansion estimates of total acres of potatoes for the growers on the list.

To estimate for growers not on the list frame, data from the June enumerative survey is used. Any potato acreage from this area frame survey which is not associated with a producer on the list is expanded by the June enumerative survey expansion factor.

These two sets of expanded data, when added, indicate total acreage for each State. The area frame estimates for approximately 10 percent of the total potato acreage in these 12 States. Harvested acreage estimates based on information from this survey are published initially in the August Crop Production report.

Yield Estimates

Yield forecasts are made in season, based on current crop conditions. Growers are asked questions in nonprobability mail surveys relating to local conditions and yield per acre for individual farms. Regression chart readings are used to interpret the indication.

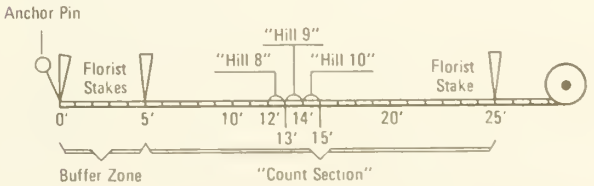


Figure 10.—How sample hills are chosen for objective measurement of potato yield.

Objective measurements, in addition to the mail survey data, are used to determine yield in the 12 major producing States mentioned above. Acreage enumerated in the multiple-frame survey are used as the sampling frame for selecting the sample. Individual fields are selected with prob-

abilities proportional to expanded acreages. Approximately 2,200 samples are selected in these States. For each sample two small plots are randomly located and potatoes are dug just prior to harvest (normally 1 to 2 days).

Information from the harvested samples is used to estimate production in October and November. The size and grade data from these samples are released in the December 1 Crop Production report.

Figure 10 illustrates a potato sample unit laid out in one row for objective measurement of yield. It shows the location of the three hills to be dug between the 5-foot and 25-foot marks in the sample and count section.

Enumerators record the number of tubers and weight from these three sample hills (the number of hills in the sample) and measure the width across four row spaces (five adjacent potato rows) from the center of the stems in row one to the center of the stems in the fifth row.

Yield per acre is derived by multiplying the computed number of hills per acre times the average weight of potatoes per hill.

Gross yields indicated by the samples are adjusted for losses by means of enumerators who revisit the fields and determine the amount of the crop left in the field after harvest. The average of all samples, together with producer postharvest interviews, disposition surveys, shipment and processor data, provides the basic data for making estimates of production.

Production Estimates

Three forecasts of production are issued for each of the four seasonal groups of potatoes and coincide with the most active harvesting periods. These forecasts are published in the monthly Crop Production report. Allowances are made for acreages abandoned for weather or economic reasons.

Estimates are revised after the harvest season when final grower reports and check data are received. A final summary including crop disposition and utilization data is released in August.

Market News Service reports on rail and truck shipments or truck unloads of potatoes at certain markets are used in checking production where recorded movement constitutes a significant percentage of a State's production. State inspection records and other recorded movement, along with market order information, are also used. In addition to data on fresh shipments, an enumeration of quantities of potatoes processed in Maine, Idaho, and other major States helps check total estimates. The farm disposition and utilization estimates are based on a special mail survey and are published annually.

Stocks Estimates

Potatoes harvested from January through September normally cannot be stored for any long period and are moved to market as soon as dug. However, most of the fall crop is placed in storage and is the principal source of marketings from October through April. SRS issues reports of stocks held by local dealers and growers in fall crop-producing areas, by States, in December, January, February, March, and April. These estimates aid producers, processors, and dealers in judging supplies on hand at specified times during the marketing season. Potatoes taken from storage for processing are also reported for seven States.

SRS estimates of potato stocks take into account that portion of the crop sold for all purposes, eaten or fed on farms where produced, and lost through shrinkage, decay, or discard.

Estimates of potato stocks are based on storage reports from individual farm operators, Market News Service recorded movement, and processor utilization data. Reported stocks are converted to percentages of production and charted against the comparable period for previous years. Differences from one month to the next are expressed in terms of percentage change. The charted indications are compared closely with shipment check data in arriving at State stock estimates. In some States, an off-farm storage survey is conducted to provide an additional indication of stocks. Reported stocks are compared with the capacity of the individual storage.

SWEETPOTATOES

Sweetpotato production is concentrated in the Southern States with North Carolina and Virginia providing approximately one-half of the U.S.

output Harvest is most active from September through October.

Estimates were first issued in 1868. The program included acreage, yield, production, and price estimates annually. In 1909, reporting of farm disposition and season average prices was started. Monthly production forecasts were added in 1912.

The sweetpotato program follows a pattern similar to that for Irish potatoes. Planting intentions are released in March, followed by acreage for harvest estimates in July. Forecasts of yield and production are published in August, September, and October. Disposition estimates are issued in August of the following year.

Acreage Estimates

Basic indications for establishing acreage estimates for sweetpotatoes are collected from farmers by nonprobability mail surveys. The March survey questionnaire asks about acreage planned for the current year and that planted the previous year. Similar surveys are conducted in June for determining actual planted acreage.

Expected acreages for harvest are based on historical relations between planted and harvested acres. These estimates may be adjusted throughout the forecast season if weather or economic conditions force producers to abandon acreage.

Weighted ratios from grower surveys indicate the percentage change from the preceding year. These are charted against comparable indications for previous years in determining estimates of acreage.

Yield Estimates

During late July, August, and September, growers are asked to report the conditions and expected yield for their locality and individual farms. Comments provided by growers on local condition, harvest progress, and damage from weather and disease are also helpful to State Statistical Offices in forecasting the crop. Reported yield and condition are correlated with final yields of previous years in deriving the forecast for the month.

Production Estimates

Production is computed from the estimates of acreage and yield per acre. Forecasts are published in August, September, and October. In November, growers are asked to report actual acreage harvested and production. These indications and other check data provide the basis for estimates released in the January annual summary.

Disposition estimates are issued in late August after the marketing season and show quantities sold, used for feed, for seed, and for household consumption. The amount of shrinkage is also shown.

Estimates on acreage, yield, and production are revised on the basis of end-of-season grower surveys and final check data. In such concentrated production areas as the Eastern Shore of Maryland and Virginia, and New Jersey, California, and Louisiana, recorded rail shipments plus truck unloads or inspections of sweetpotatoes provide a satisfactory basis for checking estimates of production. Outside these areas, however, such check data cover a relatively small part of the crop.

All estimates are reviewed following each census of agriculture and final revisions are made, if necessary, based on these indications and other data not available earlier.

MUSHROOMS

The estimating program for commercial mushrooms was initiated in 1966 for Pennsylvania, Delaware, and Maryland. Nationwide coverage began in 1967 and now includes 28 States. Mushroom production is centered in Pennsylvania, with nearly three-fifths of the U.S. total. Most of the remaining production is concentrated in the Northeast quadrant of the U.S. and the West Coast States.

The program provides estimates of total growing area, production, and value, as well as volume and value of sales for both fresh market and processing. In addition, growers' production intentions for the next year are also provided. Information published in the annual Mushrooms report is obtained from an annual survey conducted for a July-through-June year.

Data Collection

Mail questionnaires are used to survey growers and processors with followup telephone and per-

sonal interviews to obtain reports from firms not responding. Survey coverage is essentially a complete enumeration of both growers and processors.

Trade associations, State governments and universities, and other related sources are used by the State Statistical Offices in updating grower and processor lists used in the survey. In addition, grower questionnaires are designed with space for the growers to provide names and addresses of new producers in their areas. For firms with multi-State operations, the State Statistical Office of the State in which the firm's headquarters are located obtains data from the firm for all States. The individual State data are then forwarded to the appropriate Statistical Offices for inclusion in their summaries.

Estimates

State estimates are developed from completed questionnaires with an allowance for nonresponding growers or processors.

Separate summaries of grower and processor reports are compiled, with the growers' survey providing primary indications, and the latter serving as a check on possible incompleteness in coverage of the growers. ■

Chapter 6

FRUIT AND TREE NUTS

INTRODUCTION

The SRS fruit and tree-nut estimating program consists of production and utilization estimates for 17 noncitrus fruits, 7 citrus fruits, 5 tree nuts, and 8 berry crops. Separate type or variety estimates are made for the following crops: Apples; grapes and peaches in California; pears in Washington, Oregon, and California; oranges, grapefruits, and pecans.

Forecasts of production are generally started when fruit and nut crops reach a stage of development where prospective output can be subjectively judged or objectively measured. Most current production forecasts depend largely on grower-reported condition of the crop. This indication is then correlated with final production, using a regression equation. Objective yield measurement forecasting models have been developed for a number of highly commercial crops.

Beginning in 1866, condition reports on fruit and nut crops were issued during the growing season and at the end of harvest and expressed as a percentage of a full crop. A "full crop" was defined as one expected if there were no damage from unfavorable weather, insects, disease, or other factors. Beginning in 1914, the condition percentages were converted into quantitative production estimates. Similar estimates were developed back to 1909 for most commodities, except for peaches, beginning in 1899 and apples, beginning in 1889.

The first annual report of utilization estimates for fresh sales and principal processing uses was published in 1944 for all noncitrus fruits. Such data are available for citrus and various other crops, beginning in 1909.

Production estimates prior to 1959 for apples, peaches, and pears were expressed in bushels. Beginning in 1959, apple and peach estimates were expressed in both weight and bushel equivalent and pear estimates in weight only. Because of the weight variation of bushels, the apple estimates were based on a 42-pound equivalent unit, and peaches on a 48-pound equivalent, beginning in 1964.

Most of the noncitrus and nut forecasts are published in the monthly report, Crop Production. Separate releases of production forecasts are issued for cherries in mid-June, apple varieties in August, and cranberries in mid-August. In January, estimates of production, utilization, price, and value are published for most of the noncitrus crops in Noncitrus Fruits and Nuts, Annual Summary. Final utilization and price estimates for storage crops such as apples, cranberries, and pears, for which marketing is not completed by January, are included in a midyear supplement issued in July.

Forecasts of the citrus crop are also released in the monthly Crop Production report. In October, revised estimates of production, utilization, season average price, and value for the previous year are published. Citrus fruit estimates are included in Crop Production, Annual Summary, in January. The citrus crop is designated both by year of bloom and year of harvest. For example, the 1973-74 crop referred to the bloom of 1973 and production and values for 1974.

NONCITRUS FRUITS

Monthly production forecasts vary by crop, starting in May for peaches and continuing through November 1 (see table 5 for the noncitrus fruit and nut estimate dates). Annual estimates of production are made for California and Florida avocados; Washington and Oregon bush-

Table 5.—Noncitrus fruit and nut estimates

Commodity	May 1	Jun 1	Jun 15	July 1	Aug 1	Aug 15	Sept 1	Oct 1	Nov 1	Dec 1	Jan 15	May 1	July 1	Aug 1
—Noncitrus fruits—														
Apples				F	F			F			P		PU	
Apples by variety					F						P			
Apricots		F		F							PU			
Avocados (CA-FL)													P	
Bananas (HI)											PU	PU		
Bushberries (WA-OR)											PU		PU	
Cherries, sweet														
Western States		F		F				PU			PU			
Great Lake States			F	F				PU			PU			
Cherries, tart														
Western States		F		F				PU			PU			
Great Lake States			*F					PU			PU			
Cranberries						*F		F	F		P		PU	
Dates (CA)											P		PU	
Figs (CA)											P		PU	
Grapes														
California				*F	F		F	F			PU			
Other excl. California					F		F	F			PU			
Nectarines (California)		F		F							PU			
Olives (CA)											PU			
Papaya (HI)											PU	PU		
Peaches														
California		*F		F	F						PU			
9 Southern States	F	F		F							PU			
Other		F		F	F						PU			
Pears, Bartlett (WA, OR, CA)		F		F	F		F				PU			
Pears, other (WA, OR, CA)				F	F		F				P		PU	
All pears (excl. WA, OR, CA)				F	F		F				PU			
Persimmons (CA)											PU			
Prunes (CA)		F		F			F		F		PU			
Pomegranates (CA)											PU			
Plums (CA)		F		F							PU			
Prunes & plums (excl. CA)					F		F	F			PU			
—Tree nuts—														
Almonds (CA)	F	F		*F							P		PU	
Filberts (OR, WA)							*F	F	F		P		PU	
Macadamias (HI)											P		PU	
Pecans (11 Southern States)							F	F		F	P		PU	
Walnuts (CA, OR)				F	F		*F				P		PU	

*Based on objective measurement survey
F—Forecast of Production
P—Estimate of Production (End of Season)
U—Utilization

berries; Hawaii bananas and papayas; California dates, figs, pomegranates, persimmons, and olives. Acreage and yield estimates are made at the end of the season for cranberries, bushberries, bananas, and papayas.

Nonprobability Sampling

Forecasts of noncitrus fruit production are based primarily on growers' reporting the condition of a crop in their locality as percentage of a full crop.

Questionnaires are mailed to a sample of farmers in each State. Major fruit States also maintain special lists of fruit growers who receive monthly questionnaires during the forecast period. To widen the information base for estimates, State Statistical Offices often telephone large growers not responding by mail.

Individual reports returned by mail and obtained by telephone are summarized by areas or counties and weighted by the most recent estimate of crop production.

Each forecast month, the current reported condition of each crop is plotted on a regression chart in which condition is correlated with final production or yield per acre. A linear-regression estimate is computed, utilizing the historical relations.

Actual departures from the production indicated by the regression formula are plotted on a time-series chart and become the basis for determining "trend," which reflects changes in production resulting from changes in number of trees or changes in cultural methods. Fluctuations in the sample and unknown factors may also contribute to departures from the regression line.

An application of this procedure in estimating apple production is illustrated in figures 11 and 12. In figure 11, reported condition as percentage of a full crop (X axis) and final production of apples (Y axis) were plotted for the years 1962-73, and the regression line (YC = —20.505 + 7.393X) was calculated. Assuming that the condition of the new crop is reported at 70, the regression formula or the reading from the regression line in figure 11 indicates a crop of 498 million pounds. Figure 12 shows that a slightly downward trend exists, and the necessary adjustment would be minus 48 million pounds. A crop

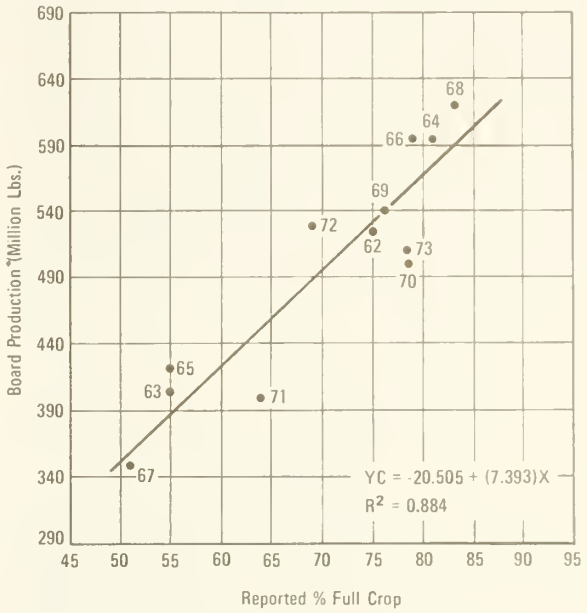


Figure 11.—Example of regression chart used to estimate a State's apple production.

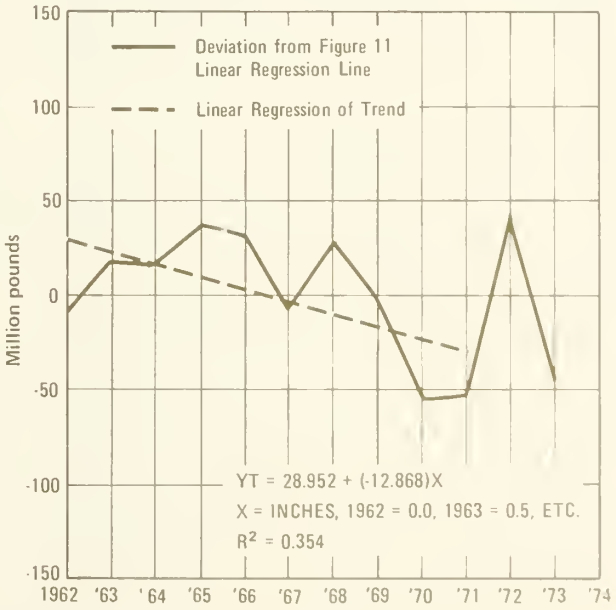


Figure 12.—Example of time-series chart showing linear regression of trend.

of 450 million pounds would be expected, based on the regression indication adjusted for trend.

Another method for obtaining an indication of production is the ratio of the reported current year's production to last year's production (as cur-

rently reported) for the sample farms. This ratio states the current/historical percentage changes in production between the two years. The reported percentage change is multiplied by last year's final estimate and is plotted against final production. As in the condition reports, actual change may differ from that shown by the sample, because replies from voluntary respondents may not be representative of all growers. A regression chart is used to interpret the indicated production.

Another indication used to a limited extent in estimating bushberry production is reported yield per acre. The regression approach used to interpret production from reported condition is equally applicable for interpreting reported yield.

The forecasting procedures discussed above are subjective in nature, in respect to both the grower's appraisal of production and the statistician's subsequent interpretation of bias or trend. Subjective programs are effectively used in gauging production, but the accuracy of the estimates is unknown. Forecasts are sometimes subject to sample biases which are not revealed until after harvest is completed. Also, for many crops, check data are not complete and accuracy of the estimate cannot be measured.

Probability Sampling

To improve the accuracy of forecasts, objective measurement methods have been developed and adopted where feasible. Generally, they have been developed in connection with needs for administering marketing agreements. The objective procedures remove the human biases associated with reports based on growers' opinions and eliminate the selectivity of voluntary mailed responses. Probability samples permit a measure of relative precision to be calculated. The estimating components required for making a directly expanded estimate of fruit production based on objective measurement techniques are:

- Number of bearing trees or acres in the population;
- Average number of fruit per tree or per acre;
- Size of fruit at maturity;
- Natural loss of fruit between time of fruit count and maturity;
- Harvest loss.

Basic to an objective yield survey is an up-to-date and accurate count of trees by variety, age, and acres. Aerial photography, administrative records and fruit-tree census tabulations are the most frequently used sources of this information.

The average number of fruit per tree is calculated from counts on sample limbs randomly selected with known probabilities. Primary limbs are selected generally with probabilities proportional to the cross-sectional areas of the limbs. Terminal limbs are selected on the same basis or in some cases with equal probability. Studies indicate that the bearing surface of a limb is closely related to the cross-sectional area at its base.

Fruit size is determined at maturity by growth curves, which project the usual growth and development of fruit between the initial observation and maturity.

Fruit loss between the initial observation and actual harvest is projected in a similar manner, using historical relations.

An illustration of an objective count and measurement survey in operation is the tart-cherry survey in Michigan aimed at forecasting the crop as of mid-June. Price negotiations between growers and processors as well as implementation of set-aside provisions of the marketing order for tart cherries are based on the mid-June forecast.

The sampling frame consists of a list of cherry producers compiled by the Cherry Administrative Board. Because of mandatory participation of all growers in the marketing order, the list is assumed to be complete. Information on total tree numbers is available by blocks for each grower. (A block is an orchard or part of an orchard with trees of the same type and age.)

A systematic sample of 300 blocks is selected with probabilities proportional to the recorded number of trees. An early-season survey is conducted to select the sample trees and determine the number of trees of bearing age. Three sample trees are selected per block.

Fruit counts, as described in this theoretical example, are made on randomly selected sample limbs. This selection process is known as the "random-path technique." The sample limb has a probability of selection proportional to limb cross-sectional area (CSA). The number of fruit on the sample limb is multiplied by the reciprocal of the sampling fraction, which gives an unbiased estimate of total fruit on the tree.

The first major branches are measured with a tape which shows CSA inches. The CSA for each limb and cumulative CSA inches are recorded. A number from 1 to 190 is selected from a random-number table to determine the individual branch selected (see figure 13). In this example, a number of 100 or less results in the selection of the branch measuring 100 square inches. The measuring and random selection process is repeated at the next and succeeding branches until the terminal branch is selected. The count of fruit on the terminal branch was 187. The sample count of 187 is multiplied by the reciprocal of the probability of selection to give the estimate of 1,954 fruit on the trees ($187 \times 209/20 = 1{,}954$). Adjustments are made in these counts to allow for the natural droppage of fruit between survey date and harvest. A sample of fruit from the terminal branch is weighed. Taking into account the timing of the survey and prior study of the growth of fruit, the weight of fruit is projected to a harvest weight.

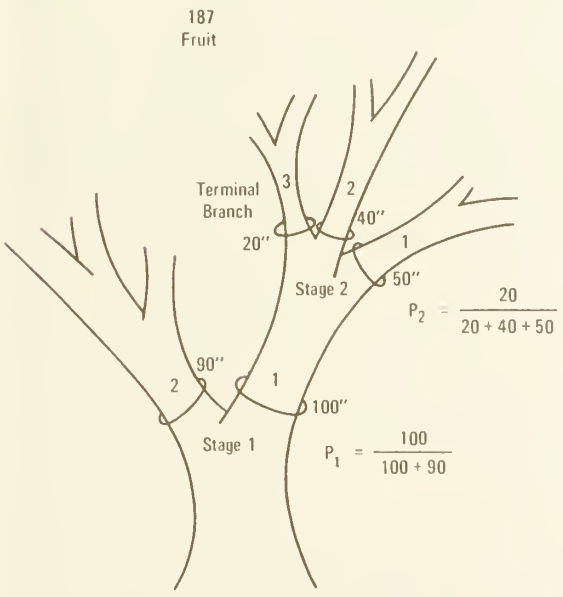


Figure 13.—Random limb selection with probability proportional to cross-sectional area.

The estimates of number of fruits per tree and weight per fruit are multiplied to determine weight of fruit per tree. The tree data are then multiplied by number of bearing trees to estimate fruit production at the State level.

Additional adjustments must be made to the direct-expansion estimate to account for losses that will occur after the initial count and through harvest. An estimate is made for these losses, based on prior surveys. Sampling error for estimated weight of fruit per tree is computed from the variability between blocks.

Objective counts and measurements, although relatively costly, lend themselves well to improving fruit estimates. However, up-to-date information on tree numbers must be available—if not, the potential value of objective procedures can be limited. Objective techniques for noncitrus crops similar to these used for the tart cherries are conducted in California on peaches and grapes. A cranberry objective measurement survey is conducted in Massachusetts. Research has been done on an apple yield forecasting model in Virginia, and application of objective procedures to forecast production is feasible.

Utilization estimates made at the end of the marketing season are largely based upon complete enumerations of fruit processors in most States. Estimates of fresh sales are less complete. The main sources of data for fresh use are marketing committees and Market News Service's rail and truck movement data. A check on fresh utilization is derived from the grower disposition survey by SRS.

Final estimates of noncitrus production and utilization are based primarily on recorded rail and truck movement, inspections, processors' receipts, marketing-agreement data, and an analysis of census of agriculture enumerations. Completeness of these check data varies greatly among States.

CITRUS FRUITS

In Florida, Texas, Arizona, and California, monthly forecasts in season are made for oranges, grapefruit, lemons, tangerines, temples, and tangelos; an annual estimate is made of limes (see table 6). Orange estimates include navels

(early and midseason varieties) as one kind and Valencias as a second kind. Grapefruit in California are estimated for the Desert Valleys and "other" areas. Florida grapefruit are estimated by white seedless, pink seedless, and "other" types.

Nonprobability Sampling

Forecasts of production in Texas, Arizona, and California, with the exception of California lemons, are based on growers' reports of condition. These condition indications are interpreted graphically from the regression formula and are adjusted for trend as described in the noncitrus fruit section on nonprobability sampling methods.

Probability Sampling

In Florida, an objective limb count survey is conducted in August and early September to estimate the number of fruit hanging on the tree at the time. Selection of terminal limbs and expansion of fruit counts are determined, using the random-path technique.

Table 6.—Citrus fruit estimates

Commodity	Oct 1	Nov 1	Dec 1	Jan 1	Feb 1	Mar 1	Apr 1	May 1	June 1	Jul 1	Oct 1
Oranges, early, midseason, navel											
Arizona	F	F	F	F	F	F	.....	.....	.....	.....	PU
California	F	F	F	F	F	F	F	F	F	F	PU
Florida	*F	.....	*F	*F	F	F	F	F	F	F	PU
Texas	F	F	F	F	F	F	F	.....	.....	.....	PU
Oranges, late											
Arizona	F	F	F	F	F	F	F	F	F	F	PU
California	F	.....	F	F	F	F	F	F	F	F	PU
Florida	*F	.....	*F	*F	*F	*F	*F	F	F	F	PU
Texas	F	F	F	F	F	F	F	F	.....	.....	PU
Grapefruit											
Arizona	F	F	F	F	F	F	F	F	F	F	PU
California, desert valleys	F	F	F	F	F	F	F	F	F	F	PU
Other areas	.....	.....	F	F	F	F	F	F	F	F	PU
Florida	*F	.....	*F	*F	*F	F	F	F	F	F	PU
Texas	F	F	F	F	F	F	F	F	.....	.....	PU
Lemons											
Arizona	F	F	F	F	F	F	F	.....	.....	.....	PU
California	.....	*F	F	F	*F	F	F	*F	F	F	PU
Limes, Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	PU
Tangelos, Florida	*F	.....	*F	F	F	F	F	F	F	F	PU
Tangerines											
Arizona	F	F	F	F	F	.....	.....	.....	.....	.....	PU
California	F	F	F	F	F	F	.....	.....	.....	.....	PU
Florida	*F	.....	*F	F	F	F	F	F	F	F	PU
Temples, Florida	*F	.....	*F	*F	*F	F	F	F	F	F	PU

*Based upon objective measurement survey.
F = Forecast
P = Estimate of production
U = Utilization estimate

The terminal limb represents approximately 10 percent of the total cross-sectional area of the primary limbs. Since the limb count survey is conducted 7 to 8 months prior to harvest, these counts are adjusted for natural loss of fruit and fruit sizing with a sequence of monthly surveys. Sample trees for the size and drop survey are drawn from a sampling frame consisting of all bearing groves fronting on a 1500-mile route that traverses the most important citrus counties.

The difference between the initial survey counts in August and later ones indicates the droppage to the time of the forecast month. Monthly drop rates are adjusted by the estimated proportion of total crop harvested by the survey date, and then this adjusted droppage is projected for the entire season, using historical relations.

The fruit size survey coincides with the drop survey. Circumference measurements are linearly correlated with weight. Immature-fruit measurements are projected to harvest size, following historical growth curves. A multiple-regression formula is used to convert volume per fruit to number of fruit constituting a box.

Two forecasting models are used to estimate production. One model is a direct-expansion estimator described earlier, which incorporates the number of trees of bearing age, initial fruit counts, projected droppage, and projected size into an indication, which is interpreted by means of multiple-regression formulas. A second model, called a volume expansion, consists of using the initial fruit counts from the limb count survey in August and adjusting for survey-measured droppage and size for each forecast month. The resulting indication is interpreted graphically, using a multiple-regression formula in which each current forecast month's indication is correlated with final production in previous years.

After harvest is well along, a row count survey is conducted monthly, using the 1500-mile route sampling frame. This survey is based on a visual evaluation of the proportion of rows picked in a sample of groves correlated with the volume of fruit actually delivered to processors. Though biased, this survey provides a reliable basis for revising forecasts when harvest is past midpoint.

Another related survey using the route frame is a maturity survey, which provides an objective indication of the quantity of finished product that will be obtained from a box of fruit. Estimates of percentage of acid, percentage of soluble solids, pounds of juice per box, and pounds of solids per box are made for the fruit sampled.

The lemon objective yield survey is conducted in southern California three times a year with fieldwork conducted around mid-October, mid-February and mid-June. Expected harvest in the area, which accounts for over 90 percent of California's production, is projected in 2-month increments for a year in advance. Size, color, and grade distribution of lemons sampled are also observed.

The projected pick is based on the number of lemons on the sample trees, adjusted by weight and diameter measurements. Survey indications are expanded to an average yield for the area by interpretation from a regression formula. The predicted yield times the acreage estimate provides the production estimate for a particular period. Estimates for the other districts are based on growers' reported condition, interpreted by a regression chart.

TREE NUTS

Monthly production forecasts for almonds commence in May, for walnuts in July, and for pecans in September (see table 5). An annual estimate for macadamia nuts is prepared in January.

Nonprobability Sampling

Forecasts in most months are based on growers' reports of condition, supplemented with production data from processors and shellers. The condition indication is interpreted graphically from the regression formula and adjusted for trend as described previously under nonprobability sampling for tree fruits.

Probability Sampling

Objective yield surveys are conducted to set the July forecast for almonds and the September forecasts for California walnuts and Oregon filberts. Selection of terminal limbs to make nut counts for almonds and filberts is based on the random-path approach. Because of the size of walnut trees, the sampler selects an accessible branch to make nut counts. Objective surveys are scheduled when the individual nuts have reached mature size;

however, the number which may drop before harvest is still an unknown variable. A sample of nuts is picked to be measured and weighed and these indications are interpreted by using a regression formula which correlates the survey counts with final yield per acre. The predicted yield indication is multiplied by the current estimate of bearing acreage for an indication of production.

TREE INVENTORY SURVEYS

There is no continuing national program of estimates of fruit and nut tree numbers or acreage. However, California has a long-time series of tree acreages by age and variety. County agricultural commissions prepare estimates of plantings, removals, and any acreage changes by variety and age groups. These estimates supplement a program in which one-fifth of the counties are enumerated each year.

In 1965, Florida began indexing citrus groves by aerial photography. Photos are updated in alternate years and include details by variety and age of trees based on ground verification of the photos.

Tree inventory information in other States is limited largely to special surveys at periodic intervals. These surveys, when funds are available, utilize standard procedures and questionnaires in all States in the region in order that the data can be summarized for the region. The survey covers all known commercial growers (those with 100 or more trees of any one kind of fruit or vineyards with 500 or more vines). Information is based on complete enumeration of growers or a combination of mail inquiries with enumeration followup of most nonrespondents. ■

Chapter 7

LIVESTOCK

INTRODUCTION

The livestock estimating program provides statistics on cattle and calves, hogs and pigs, sheep and lambs, and goats. Reports cover inventory numbers, births, number on feed, wool and mohair production, slaughter, production, disposition and income, number of farms with each species, conditions of pasture and ranges, and wheat pasture. This comprehensive program evolved from an annual esimate of the livestock inventory inaugurated in 1866.

To keep abreast of changes in agriculture and to satisfy increased data needs, especially in the livestock industry, SRS has made many adjustments in survey techniques and estimating procedures. For years, surveys consisted of questionnaires mailed to informed individuals, asking about livestock inventories, marketing weights, deaths and other losses, diseases, and breeding and other management practices in their locality. Today, scientific probability surveys select producers to be asked specific questions about the livestock on their farms and ranches.

GENERAL METHODS

The methods of preparing indications and analyzing the survey data have also improved. Today, direct expansions of the estimated items from probability surveys either replaced the "identical" (current/current or C/C) percentage change and average-per-farm indications from nonprobability mail surveys, or are available in addition to those indications. The time-series chart (see figure 14) has replaced the dot or regression graph, enabling the statistician to review and interpret several indicators at one time rather than consider each indication on an individual chart.

The procedure used for estimating inventory numbers for each livestock species is basically the same. State statisticians recommend estimates for their States and transmit them to SRS in Washington, D.C. The State data are summarized nationally and by major regions or State groupings. The Crop Reporting Board members review the various data and establish national and regional estimates. Maximum use is made of survey data and other information available at the national and major State grouping levels. Individual State recommendations prepared in the field offices are reviewed and changed, if necessary, to bring them to the level of the established national and regional estimates.

Survey indications are used to establish the best current inventory estimates. Inventory data are considered the most reliable indications from sample surveys, since producers report numbers actually on their farms at the time of the survey. On the other hand, births, deaths, and farm slaughter are historical items of information and can be subject to memory bias. A balance sheet and its components are also reviewed when the inventory numbers are established. Commercial slaughter is considered an important element of the balance sheet at the national level and should be reliable, since it represents a near actual count of animals slaughtered. Live imports into the United States and exports to other countries are considered actual counts.

Theoretically, the supply minus disposition components of the balance sheet should give the current inventory. However, each component of

the balance sheet has varying degrees of possible estimation error. Therefore, to be most useful as an indication of inventory, each component should be estimated on the basis of all available information. The supply components of the U.S. balance sheet are the beginning inventory, births, and imports (inshipments for State balance sheets). From this sum, commercial slaughter (marketings at State level), farm slaughter, deaths, and exports are subtracted. The result is the indicated number on hand at the end of the period or year. An example of the cattle and calves balance sheet used in estimating the January 1, 1974 U.S. inventory is shown below.

Cattle and calves balance sheet—United States, 1973

Supply

Item	Number (1,000 head)
January 1, 1973 inventory	121,534
Calf crop	49,034
Imports	1,035
Total supply	171,603

Disposition

Item	Number (1,000 head)
Commercial slaughter	35,936
Farm slaughter	467
Deaths	6,500
Exports	273
Total disposition	43,176
Indicated January 1, 1974 inventory (supply less disposition)	128,427
Estimated January 1, 1974 inventory	127,540
Difference (indicated less estimated)	887

Check data, along with the original survey results, are utilized as a basis for reviewing and revising preliminary inventory estimates, if necessary. Check data include the number of animals slaughtered in commercial plants, shipments, and information from assessors and the State farm census. U.S. census of agriculture figures available every 5 years provide additional check data.

HOGS AND PIGS

Four Hogs and Pigs reports are issued each year that provide data users with the basic supply statistics for forecasting pork production. The reports relate to March 1, June 1, September 1, and December 1 and are issued between the 20th and 25th of the month. The basic data included in these reports are inventories on farms, numbers of sows farrowing, and pig crop.

The December report provides estimates for each State and the United States. The June report provides separate estimates for 23 States that account for about 95 percent of the U.S. hog production, a combined estimate for 27 other States, and U.S. totals (see table 7 for State groupings). The March and September reports are limited to data for 14 States that have about 86 percent of the nation's hog population.

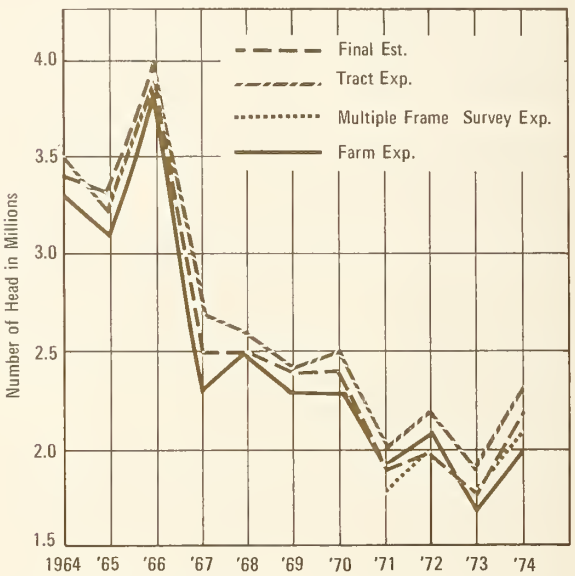


Figure 14.—Example of a time-series chart used in the formation of estimates for a State, region, or the United States (the example represents all hogs and pigs inventory indications and estimate for a State).

Survey Basis for the Estimates

Three types of surveys are used to collect data from producers for hog and pig estimates: Probability multiple-frame surveys, probability area frame surveys, and nonprobability mail surveys. In multiple-frame surveys, farm operators with land in the segments of the SRS area frame who are not accounted for on the list frames of hog producers are surveyed each quarter to measure the incompleteness of the list frame.

Direct expansions of the items to be estimated are computed from the probability surveys. The items for which expansions are computed are: Numbers of (1) total hogs and pigs, (2) hogs and pigs kept for breeding, (3) market hogs and pigs by weight groups, (4) sows farrowed, (5) sows

intended to farrow, (6) pigs on hand and pigs already sold from farrowings within past 3 months or 6 months, (7) those slaughtered on farms, and (8) those that died.

The nonprobability mail surveys are summarized by size-group strata (size groupings determined by inventory of total hogs). These surveys provide three types of indications for hog estimates: (1) ratio of the number reported per hog farm multiplied by the estimated number of hog farms, (2) year-to-year comparisons of reports from the same respondent (called, in SRS parlance, "identical current/current percentage change"), and (3) ratio of selected items to the total inventory reported. The ratio of selected items to the total inventory is also computed from the direct expansions from the probability surveys.

Forming the Estimates

The survey analysis and estimating processes include a comparison of the probability expansions with historical survey and Crop Reporting Board levels and a review of the sampling errors associated with each current indication. Probability area frame expansions of total hog and pig inventories for the United States have a coefficient of variation (sampling error) of 3 to 4 percent. The States providing estimates quarterly with a multiple-frame survey give a coefficient of variation of less than 2 percent for the 14-State total. The coefficients of variation by States usually range from 3 to 8 percent for the total inventory in these 14 States.

Inventory

Hogs and Pigs reports provide inventory estimates as of the first of March, June, September, and December. The reports indicate numbers of all hogs and pigs on farms, distinguishing those kept for breeding and those intended for market. Hogs and pigs for market are divided into five weight groups: Under 60 pounds, 60-119 pounds, 120-179 pounds, 180-219 pounds, and 220 pounds and over.

In estimating hog and pig numbers, survey indications are used to first establish the best current inventory estimates of all hogs and pigs.

Table 7.—Survey basis for hog and pig estimates

Survey date	Area	Survey basis for estimates	Percentage of U.S. all hogs and pigs December 1, 1973
December 1	14 Quarterly States[1]	Probability multiple-frame and probability area frame surveys	86
	36 Other States[2]	Nonprobability mail and probability area frame surveys	14
March 1	14 Quarterly States[1]	Probability multiple-frame survey	86
June 1	14 Quarterly States[1]	Probability multiple-frame and probability area frame survey	86
	9 Major States[3]	Nonprobability mail and probability area frame surveys	9
	27 Other States[4]	Probability area frame survey	5
September 1	14 Quarterly States[1]	Probability multiple-frame survey	86

[1] Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Minnesota, Missouri, Nebraska, North Carolina, Ohio, South Dakota, Texas, and Wisconsin.
[2] States other than noted in footnote 1. Area frame survey not conducted in Alaska and Hawaii.
[3] Alabama, Michigan, Mississippi, North Dakota, Oklahom Pennsylvania, South Carolina, Tennessee, and Virginia.
[4] Limited-estimate States. States other than noted in footnotes 1 and 3. Area frame survey not conducted in Alaska and Hawaii.

Inventory data are considered the most reliable indication from sample surveys, since hog producers are asked to report animals on their farms at the time of the survey. Figure 14 illustrates the type of chart used in evaluating survey data for the inventory estimates. The balance sheet and its components are also reviewed when the inventory numbers are established. A balance sheet indication is prepared for each State, for the 14 States reporting quarterly, and for the United States.

Once the inventory estimate for all hogs and pigs is established, it is separated into estimates of hogs for breeding and hogs for market. This is done on the basis of survey-reported numbers in two classifications as a percentage of total reported hogs and pigs. The total number of market hogs is used to establish the number in each weight group, following the same procedure used for estimating the two classes.

Sows Farrowing

The June and December Hogs and Pigs reports provide estimates of the number of sows that actually farrowed during the preceding 6 months and the number of sows that are expected to farrow during the following 6 months. The actual farrowings are further divided into two 3-month periods. For example, the December report will provide estimates of number of sows farrowed during the preceding June through November, separated into two periods—June through August and September through November. The report also includes estimates of the number of sows expected to farrow during December through May of the following year.

For the 14 States that report quarterly, all four Hogs and Pigs reports provide actual number of sows farrowing in the previous quarter and expected farrowings for the following two quarters. The procedure for estimating farrowings is similar to that used in preparing inventory estimates.

Pig Crop

The pig crop is defined as the number of pigs from farrowings during the period that are still on the farm at the end of the period or were sold or slaughtered during the period. For example, in the States reporting quarterly, the pig crop for March through May would be the number of pigs born March through May that were on hand June 1, or had been sold or slaughtered. Pig crops are estimated for each period for which actual farrowings are published, except in States not reporting quarterly. In such States, pig crops are estimated only for the two 6-month periods—December through May and June through November.

The pig crop for each period is obtained by multiplying the number of sows farrowed by an estimated number of pigs per litter. The number of pigs reported on the survey divided by the number of sows farrowed provides the indication for estimated average number of pigs per litter. The policy is usually to adopt the number of pigs per litter from the survey unless the number is significantly influenced by a few atypical operations.

Revisions

Revisions of estimates are published in the next Hogs and Pigs report, which includes estimates for the specific group of States for which revisions are required. All the estimates for the previous year and current year are again subject to review and revision each December. Revisions are based primarily on data that become available following the initial estimates, such as marketings, the balance sheet indication (which includes latest slaughter and shipment data), State farm census, or assessments. The initial survey data are also reevaluated in light of any revisions suggested by the other data.

CATTLE AND CALVES

Two reports are issued annually on cattle and calf inventories and calf births. A report issued about February 1 provides estimates of cattle and calf inventories as of January 1 and number of calves born during the previous year. A second report issued in late July provides July 1 cattle and calf inventories and number of calves born and expected to be born during the year. The February report provides estimates for all States and the United States. The July report includes separate estimates for 28 States that account for 88 percent of the U.S. inventory, a combined estimate for the other 22 States, and U.S. totals (see table 8 for listing of States).

Table 8.—Survey basis for cattle and calf inventory and calf crop estimates

Survey date	Area	Survey basis	Percentage of U.S. all cattle and calves January 1, 1974
January 1	28 States [1]	Probability multiple-frame and probability area frame surveys	88
	22 States [2]	Nonprobability mail and probability area frame surveys	12
July 1	28 States [1]	Probability multiple-frame and probability area frame surveys	88
	22 States [2]	Probability area frame survey	12

[1] Alabama, Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Mexico, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Wisconsin, Wyoming.
[2] States other than noted in footnote 1. Area frame survey not conducted in Alaska and Hawaii.

Survey Basis for the Estimates

Three types of surveys provide data for estimating cattle and calf inventories and number of calves born.

Direct expansions for all cattle and calves, cattle and calves by classes, calves born, farm slaughter, and deaths are computed from the probability area frame and multiple-frame surveys. Farm slaughter and deaths during the year are collected only during year-end surveys and are used for preparing the balance sheet, and production, disposition and income estimates.

The nonprobability mail survey data provide three types of indications for cattle estimates:

(1) Ratio of the number of cattle reported per farm surveyed multiplied by the estimated number of cattle farms.
(2) Year-to-year comparisons of reports from the same respondent, (C/C percentage change).
(3) Ratio of selected items to the total inventory reported.

Forming the Estimates

A thorough review of survey indications precedes the setting of estimates. This review includes a comparison of current survey expansions and indications with historical survey and Crop Reporting Board levels. The sampling error associated with each estimate from the current probability surveys is also reviewed. Total cattle and calf inventory expansions from the probability area frame surveys have a coefficient of variation (sampling error) of about 2 percent at the U.S. level. In the July report, the 28-State total inventory based on probability multiple-frame surveys has a coefficient of variation of about 1 percent. For individual States conducting multiple-frame cattle surveys, the total inventory coefficient of variation usually ranges from 2 to 5 percent.

Inventory

The cattle inventory estimates as of January 1 and July 1 cover all cattle and calves, which are separated into eight classifications by sex and weight. The eight classifications include: All cows and heifers that have calved (broken down into beef cows and milk cows); heifers 500 pounds and over (divided into beef cow replacements, milk cow replacements, and other heifers); steers 500 pounds and over; bulls 500 pounds and over; and heifers, steers, and bulls under 500 pounds.

The first step in estimating various classes of cattle is to establish the complete cattle and calf inventory estimate, using, primarily, current survey data. The balance sheet at the U.S. and State levels and its components are also reviewed when establishing the total inventory. Cattle charts similar to figure 14, plotting cattle and calf survey data and estimates, are used for the total inventory estimates.

The estimate of all cows and heifers that have calved is established next, using survey expansions similar to those used for setting the all-cattle-and-calf inventory. In addition, the survey-reported relations of all cows to the total cattle and calf inventory are considered. The estimates for the other classes are based primarily on the

survey-reported number for each class as a percentage of the total reported number.

Calf Crop

The primary survey indications used to estimate the calf crop are: (1) The survey ratio of calves born and expected to be born to all cows times the estimated number of all cows as of the survey date, and (2) expansions from the probability area frame and multiple-frame surveys.

Revisions

All estimates for the year are subject to review during the January following release. The review takes into consideration later data such as State farm census, assessment, and balance sheet components. Any necessary revisions are published in the report issued about February 1.

CATTLE ON FEED

Cattle and calves on feed are defined as those being fattened on grain or other concentrates for slaughter market, and expected to produce a carcass that will grade Good or better. Estimates are made monthly for 7 States representing about 70 percent of the cattle on feed in the United States; quarterly estimates are made for 23 States (including 7 States that report monthly) representing about 96 percent of the U.S. number; and annually, as of January 1, for the remaining 27 States.

Types of Estimates

Estimates prepared monthly for the seven States include: The number of cattle and calves on feed on the first of each month; the number of cattle and calves placed in feedlots during the preceding month; and the number of cattle marketed from feedlots for slaughter during the preceding month.

The estimates made as of the first of January, April, July, and October for the 23 States include:

(1) The number of cattle and calves in feedlots being fattened for slaughter as of the first day of each quarter.

(2) The total separated into three kinds:
   (a) Steers and steer calves,
   (b) heifers and heifer calves,
   (c) cows and others.

(3) The number by kinds is classified into the following weight groups:
   (a) Under 500 pounds,
   (b) 500-699 pounds,
   (c) 700-899 pounds,
   (d) 900-1,099 pounds,
   (e) 1,100 pounds and over.

(4) The number of cattle and calves placed in feedlots during the preceding 3 months.

(5) The number of cattle marketed from feedlots for slaughter during the preceding 3 months.

(6) The expected marketings from feedlots for slaughter during the next 3 months.

Estimates in the 27 States reporting annually are limited to an inventory total as of January 1.

A special feature in the January Cattle on Feed report is estimates of the number of cattle feedlots and number of fed cattle marketed during the preceding year by size of feedlot for the 23 States in the quarterly program.

Survey Basis for Estimates

Estimates of number of cattle on feed are based on reports from cattle feeders obtained by mail and personal enumeration. Each State Statistical Office maintains as complete a list as possible of cattle feedlots, which are stratified by size for survey purposes. Each SSO receives reports from virtually all large cattle feeders by mail or interview; estimates for the smaller feeders are based on mail reports from a sample of the feeders.

The quarterly Cattle on Feed reports for the 23 States are based on data from feedlot operators who account for about 65 percent of the estimated cattle on feed. For monthly estimates, reports are received from those having about 70 percent of the cattle on feed in the seven States. This high sample coverage is possible since an increasing number of cattle are fed in large lots ranging up to 100,000 head or more.

Cattle feeders are stratified by size for survey summarization purposes. The stratification is based on feedlot capacity for larger feedlots and historical inventory numbers for smaller feeders. Indications from the monthly and quarterly sur-

veys used to prepare estimates of number of cattle on feed include: (1) Direct expansions; (2) ratio-to-capacity expansions; (3) C/C "identical" expansion from previous year; (4) C/C "identical" expansion from previous quarter; (5) C/C "identical" expansion from previous month (only for States reporting monthly); and (6) ratios of selected items to reported inventories.

In the 27 States reporting annually, cattle-on-feed data are collected as part of the January 1 cattle and calf inventory survey. The indications used in these States are the C/C identical from the previous year and the reported number of cattle on feed in the survey as a percentage of the total reported cattle and calf inventory times the estimated cattle and calf inventory.

Forming the Estimates

A thorough review of the survey indications precedes the setting of estimates. This review includes a stratum-by-stratum review of the current indications with previous surveys, as well as a comparison of the State and regional expansions and indications with historical survey and Crop Reporting Board levels.

Inventory

The inventory number of cattle and calves on feed is set first, based on the survey expansions. For quarterly reports, this number is then separated into steers and steer calves, heifers and heifer calves, and cows and others, based on the comparable reported number of each kind as a percentage of total reported cattle and calves on feed. The total number of each kind of cattle on feed is divided into weight groups, following the same procedure used for estimating the kinds on feed.

Placements and Marketings

Monthly and quarterly placements and marketings of fed cattle are estimated, using primarily the survey ratio of the reported number placed, marketed, or expected to be marketed during the period to the reported number of cattle and calves on feed, times the estimated number on feed. Check data, such as shipments of feeder cattle into each State, are also utilized in estimating placements. Steer and heifer slaughter provides supplementary data for estimating actual marketings.

An important indication for estimating expected marketings during the following 3 months is the estimated number on feed in selected heavyweight groups that normally would be marketed during those months. This number is interpreted by use of regression charts that show the historical relations of the number on feed in the heavyweight groups to estimated actual marketings for the period.

Cattle Feedlots and Fed Marketings by Size of Feedlot

The estimates of the number of cattle feedlots and fed-cattle marketings by size of feedlots are published each January, based primarily on data collected from monthly and quarterly surveys.

The estimated feedlots with a capacity of 1,000 head or more represent the number of lots that operated any time during the year. Lots vacant during the entire year are not counted. On the other hand, the estimated lots under 1,000-head are those feeding cattle at the end of the year.

The estimate of cattle marketed from lots with a capacity of 1,000 head or more is based on an almost complete enumeration. SRS State Statistical Offices prepare estimates for the few large lots that fail to provide the requested data, hence published data cover the entire universe.

The number of cattle marketed from lots with less than 1,000-head capacity is largely derived from the estimated number marketed from all lots less the number marketed from lots with 1,000-head or more capacity.

Revisions

Estimates of cattle on feed are subject to review and revision in subsequent reports. Any necessary revisions in quarterly estimates are published in the next quarterly report. Monthly estimates within the current quarter can be revised at the time of each monthly report.

Estimates for all months and quarters of the preceding year are reviewed and revised, if necessary, in connection with the January reports.

Revisions are based primarily on slaughter and shipment data, and on reports from feedlots that

were not available for preparing the initial estimates.

SHEEP AND LAMBS

January 1 sheep and lamb inventories by classes, and estimates of the previous year's lamb crop by States and for the Nation are provided in a report issued in late January. Estimates of the number of sheep and lambs shorn and wool production for all States during the preceding year are published in April. A March report provides estimates of the early lamb crop in California, Kansas, and Texas—three major early lambing States.

In July, preliminary estimates of number of sheep shorn, wool production, and lamb crop for the current year are published. Separate estimates are provided for 25 major sheep States, a combined estimate for 24 States, and U.S. totals. Hawaii is excluded from the sheep and lamb statistics program.

Survey Basis for Estimates

A mail survey provides basic data for estimating the January 1 sheep and lamb inventory, lamb crop, number of sheep shorn, wool production, deaths, and farm slaughter during the previous year. A July 1 mail survey provides the basic data for preliminary estimates of lamb crop, the number of sheep and lambs shorn, and wool production.

For survey purposes, each State maintains as complete a list as possible of sheep producers, including a measure of size of each operation. The primary source of information for developing these lists is the file of applications by sheep producers for wool incentive payments. State farm censuses and other information are also used. Sheep producers on the list are stratified by size of operation, and sample names are selected by stratum for survey purposes, with the larger operations sampled at the highest rate. Questionnaires are mailed to all selected producers, with followup personal contacts of the largest producers who do not respond to the mail inquiry.

Survey data are summarized by stratum and provide the following indications:

(1) Ratio of the item of interest to each survey farm, expanded by the number of sheep farms.
(2) Ratio of the item of interest to the control variable used to stratify the list, expanded by the sum of the control variable for all units in the universe.
(3) Year-to-year comparisons of reports from the same respondent (C/C percentage change).
(4) Ratios of selected items to the total inventory.

Forming the Estimates

A thorough review of the survey indications precedes the setting of estimates. This review includes a stratum-by-stratum comparison of the current indications with previous surveys, as well as a comparison of the State and regional expansions and indications with historical survey and Crop Reporting Board levels.

Inventory

The sheep and lamb inventory as of January 1 includes estimates of the number of all sheep and lambs, sheep and lambs on feed, and stock sheep and lambs. Stock sheep and lambs include four classes: Ewe lambs; wether and ram lambs; ewes 1 year old and older; and rams and wethers 1 year old and older.

The inventory excludes new-crop lambs (those born after September 30). Separate estimates are provided for the new-crop lambs on hand January 1.

The estimate of number of sheep and lambs on feed January 1 is based primarily on special surveys of feeders and is published prior to the stock sheep and lamb inventories in the January Sheep on Feed report.

All stock sheep and lamb inventories are established by procedures similar to those used for estimating cattle and calves. Once the total stock sheep and lamb inventory is set, it is divided into the four classes, whose numbers are proportional to the percentage indications given by the sample.

Lamb Crop

The primary indications used to estimate lamb crop are: (1) The survey ratio of lamb crop as a percentage of ewes 1 year old or older and (2)

expansions from the surveys.

The annual lamb crop includes lambs alive on July 1, or sold before July 1 in the Native States and lambs docked or branded in the Western States. (Native States are those east of the Rocky Mountains, except Texas). The number of early lambs as of March 1 in Kansas and Texas are lambs alive on March 1 that were born between October 1 and March 1. In California, early lambs are lambs alive on March 1 that were born between September 1 and March 1.

Sheep Shorn and Wool Production

For wool production estimates, producers are asked to report the number of sheep and lambs shorn on their farms or ranches and the total pounds of wool produced. From this information the average weight per fleece is derived.

The estimate of number of sheep shorn is based on the expanded numbers from January and July surveys and the relation of the number shorn to the total January 1 inventory. In the Western States, in estimating the number shorn, the January 1 inventory is adjusted for losses and slaughter marketings that occurred before shearings.

Shearing of fed sheep and lambs is estimated separately from that of stock sheep in States where this is an important practice. In these States, the two estimates are added together to obtain total number of sheep and lambs shorn and total wool production.

Data from applications filed in connection with the wool incentive payment program, when available, are also used in preparing the April estimate of number of sheep and lambs shorn and wool production for the previous year. Tabulations from this program provide data on wool production and the number of sheep and lambs shorn by month and year of clip.

Sheep on Feed

Reports on number of sheep and lambs on feed are issued in November, January, and March. Each provides estimates for seven major States of the inventory of sheep and lambs on feed as of the first of the month, separated into the following five weight groups: (1) Under 70 pounds; (2) 70-79 pounds; (3) 80-89 pounds; (4) 90-99 pounds; and (5) 100 pounds and over. These reports also include estimates of the number placed and marketed during previous periods. In addition to the seven major States' data, an inventory total for 19 other States is included in the January report.

Sheep and lambs on feed are defined as animals being fattened for slaughter market on grains, other concentrates, or succulent pasture, and are expected to produce a carcass that will grade Good or better. Lambs born after October 1 (September 1 in California) are excluded from the estimate of lambs on feed January 1 of the following year.

Survey and estimating procedures for sheep and lambs on feed are similar to those for cattle on feed.

Revisions

The January 1 inventory and lamb crop estimates are subject to review and revision the following January. Revisions are based on assessment, State farm census, and marketing data which become available after the original estimates are made.

Estimates of the number of sheep shorn and wool production are subject to revision in April two years after actual shearing. Data from applications filed for wool incentive payments for the year when payments are made are the primary basis for revising estimates of number of sheep shorn and wool production. Receipts at wool warehouses provide supplemental information.

Revisions in the November estimates of sheep and lambs on feed are published in the following January report and in November and January a year later. The January and March estimates are subject to review and revision, if necessary, in the next January report. Revisions are based primarily on marketing data not previously available.

GOATS AND MOHAIR

Estimates pertaining to goats are made only for Texas; no other State has significant production. Estimates include January 1 inventory numbers of goats on farms and ranches, the annual number of goats clipped, and mohair production.

The January 1 goat inventory in Texas is published in late January. The number of goats clipped and mohair production during the previous year are published each April.

Each estimate is based on direct expansion from the State multiple-frame survey. Additional information for mohair production estimates comes from warehouse receipts and tabulations from the mohair incentive payment program.

LIVESTOCK SLAUGHTER

Livestock slaughter statistics consist of two major series: Commercial slaughter, and slaughter done on farms and ranches where livestock are produced.

Commercial Slaughter

Estimates include commercial slaughter done under Federal and non-Federal inspection. "Federal" covers slaughter actually done under Federal inspection. Nonfederally inspected slaughter includes that done under State inspection programs and in "custom only exempt" plants. Meat production from this latter type of plant cannot be sold commercially, and consists largely of slaughter done for farm and ranch operators.

State and national commercial slaughter estimates of cattle, calves (including vealers), sheep and lambs, and hogs cover number of head slaughtered, their average live weight, and total live weight. Total pounds of red meat are also estimated at the national level. National data also reflect federally inspected slaughter of cattle classified as steers, heifers, cows, and bulls and stags. Cows, and bulls and stags are further classified as canners and cutters. Hogs are classified as barrows and gilts, sows, and stags and boars. Sheep and lamb estimates also include yearlings. The number of head in each class and its percentage of the species total are estimated. In addition to the above items, the average dressed weight is provided for each of the cattle classes, along with calves and vealers, hogs, and sheep and lambs.

The Livestock Slaughter report is issued near the end of each month and relates to slaughter during the preceding month.

Collection of Data for Federally Inspected Slaughter

The number of head slaughtered under Federal inspection is obtained from reports prepared by the meat inspectors under the supervision of Animal and Plant Health Inspection Service, USDA. Meat inspectors record the number of head slaughtered daily of each species; if the plant operates on two shifts, a report is completed for each shift. Hence, the number of head slaughtered is obtained by complete enumeration. One copy of this report is mailed to the nearest office of the Livestock Market News Branch of the USDA's Agricultural Marketing Service, where the data are transcribed to a daily listing sheet. The Livestock Market News Branch offices send the completed daily listings to the Statistical Reporting Service in Washington, D.C. Weekly totals are generated from the daily reports, and the data returned to the Livestock Market News Branch in Washington, D.C., for weekly publication. The daily and weekly summaries provide the total monthly number slaughtered in all federally inspected plants, by States and for the Nation. Daily totals are used to adjust monthly slaughter for weeks that begin and end in different months.

Federal meat inspectors classify cattle slaughtered as steers, heifers, cows, and bulls and stags. Classification of the other species is determined from a monthly mail survey of federally inspected slaughter plants, conducted by the SRS Livestock, Dairy and Poultry Branch in Washington, D.C. The number of cows, and bulls and stags that are classed as canners and cutters is also determined from the monthly mail survey.

The monthly survey of federally inspected slaughter plants also is used to determine the average live weight and average dressed weight of cattle, hogs, sheep and lambs, and the dressed weight of steers, heifers, cows, and bulls and stags.

The proportion of total commercial slaughter that is federally inspected has been increasing each year. In 1973, slaughter in federally inspected plants accounted for 90.6 percent of the cattle, 80.4 percent of the calves, 94.1 percent of the hogs, and 96.2 percent of the sheep and lambs.

Collection of Data for Nonfederally Inspected Slaughter

Data for nonfederally inspected slaughter comes from State records as well as from mail surveys of plants conducted by State Statistical Offices. Where complete State inspection data are not available, or where there is custom-exempt slaughter, the following procedures are used by State Statistical Offices. Nonfederally inspected plants are stratified into those slaughtering 2 million pounds or more per year, those slaughtering between 300,000 pounds and 2 million pounds annually, and those slaughtering less than 300,000 pounds. All of these plants are surveyed monthly; the large plants are usually contacted in person or by phone to ensure getting data for each month's report. In most States, the nonfederally inspected slaughter estimate is based on complete or nearly complete enumerations.

Several indications are employed for estimating nonfederally inspected slaughter by plants not reporting. The indications include a ratio-to-base expansion, a month-to-month "identical" expansion, and an average-per-plant expansion. An indication of average live weight is computed for each species and is the basis for the estimated live weight for nonfederally inspected slaughter.

The State Statistical Offices recommend estimates of nonfederally inspected slaughter and average live weight. These are sent to Washington, D.C., for review and consolidation into regional and national totals. State estimates of nonfederally inspected slaughter are then combined with federally inspected slaughter for the estimate of total commercial slaughter for each State and the Nation.

Red Meat Production

Red meat production is computed from commercial slaughter on a national level for beef, pork, veal, lamb, and mutton. For beef, veal, lamb, and mutton, meat production is computed, using a dressing percentage applied to total live weight after an allowance is made for the number of head condemned. Pork production is computed in a similar manner except that the dressing percentage is reduced to adjust for lard and pork fat rendered per head to arrive at a net dressing percentage. Meat production for each species is then added to obtain a total of all red meat, with lard production estimated separately.

Lard Production

Estimates for production of lard are made apart from the estimate of red meat production. The quantities of lard rendered, lard refined, pork fat rendered, and pork fat refined in federally inspected livestock slaughter and meat-processing plants are recorded by the Meat Inspection Division of the Animal and Plant Health Inspection Service, USDA. These data are provided to SRS each week. After these data are received by SRS, weekly totals are combined to form the total for the calendar month.

Estimates of lard production from slaughter that is reported by the nonfederally inspected slaughter plants is added to federally inspected lard to arrive at total commercial lard production.

Farm Slaughter

Annually, livestock farm operators are surveyed to obtain data on the number of each species slaughtered on their farms in the past year. This becomes the basis for the farm slaughter estimate, which is added to commercial livestock slaughter (by 3-month periods) to obtain total slaughter and is published in the annual slaughter report each April. Primary indications are the direct expansions from the December enumerative survey, the multiple-frame survey, and nonprobability mail survey indications.

The average live weight for farm slaughter is based primarily on a survey of farm producers conducted every 5 years. These data are used as benchmarks for estimates of average live weight of farm slaughter in intervening years.

MEAT ANIMALS: PRODUCTION, DISPOSITION, AND INCOME

State and national estimates of the production, disposition, and income from meat animals—cattle and calves, sheep and lambs, and hogs—are published annually. Estimates for each species include the number of pounds produced and sold, value of production, cash receipts, value of home consumption, gross income, and the number of deaths and number of animals slaughtered on farms.

Estimating these components by States is a detailed process because of the way livestock are raised and marketed. Livestock production depends on births, deaths, and increases in weight of the animals. Disposition of the animals through slaughter and deaths is continuous, with varied ages and weights at slaughter and various class proportions from year to year.

Furthermore, the entire livestock production process is not always completed within the locality where the animals were born. There is an extensive movement between States of unfinished animals to be "'grown out" or "finished".

The following data components are involved in the computations for this report:

(1) Livestock inventories as of January 1 for cattle and sheep, and December 1 for hogs.
(2) Birth of calves, lambs, and pigs during the year.
(3) Average inventory live weights.
(4) Deaths and farm slaughter.
(5) Numbers and average weights of marketings and inshipments obtained from records of State health inspection, stockyards, and packers.
(6) Average monthly prices received by farmers.

Estimates of the annual volume of livestock production in each State, by species, are developed by three separate operations. The first involves beginning-of-year inventories. The number for each species is divided into groups based on sex and either weight, age, or purpose. Average live weight per head for each group is estimated and multiplied by the number of head at the beginning of the inventory period to give the total inventory weight. This is also done at the end of the year, and the difference between the two totals is the yearly increase or decrease in inventory live weight.

The next operation is to determine the items of increase and decrease that are responsible for the changes in inventory numbers during the year. The beginning inventory plus births and inshipments minus marketings, farm slaughter, and deaths equals the ending inventory. Estimates of these components are based on surveys and available records.

The third step in estimating annual livestock production is to determine the total pounds of live weight involved in all marketings. For each species series (the number of animals shipped in, marketed, slaughtered locally, and slaughtered on farms) there is a corresponding series of estimated live weights, by States. The product of species number times average live weight yields total pounds.

The total weight of animals marketed, slaughtered locally, and slaughtered on farms is obtained for each species and the total weight of "unfinished" animals shipped in is subtracted. The resulting difference is adjusted by the difference obtained from the beginning-of-year and end-of-year inventory live-weight aggregates. The resulting amount represents total pounds produced.

Value is computed by multiplying production by the weighted average price per hundredweight. The average price is obtained by weighting monthly prices received by quantities marketed each month.

The procedure used to estimate farm production of meat animals permits the computation of cash receipts and gross income from meat animals. Cash receipts are derived by multiplying the estimated marketings and slaughter (in pounds) by the respective season average prices received by farmers. Gross income is the sum of the cash receipts and the value of farm and custom slaughter that was consumed on the farms where produced.

NUMBER OF LIVESTOCK FARMS BY SPECIES

Estimates of the number of livestock farms by species—those with cattle, milk cows, hogs, and sheep—are published annually. A species farm is defined as having one or more of the species on hand during the year.

Indications of the number of livestock farms by species come from several sources. The June and December enumerative surveys and the multiple-frame surveys give direct expansions of farm numbers. Many State Statistical Offices obtain the number of livestock species farms in conjunction with crop surveys. Counts obtained from a State farm census in some States provide additional indications for these estimates. Special enumerations and lists, such as the list of wool and

mohair producers filing applications for incentive payments, are also used in the estimation process. The U.S. census of agriculture provides a count of these farms every 5 years.

These statistics are used to help identify trends affecting the number of farms and ranches engaged in livestock production. Within SRS, these estimates are utilized to determine factors for expanding nonprobability survey averages to total numbers.

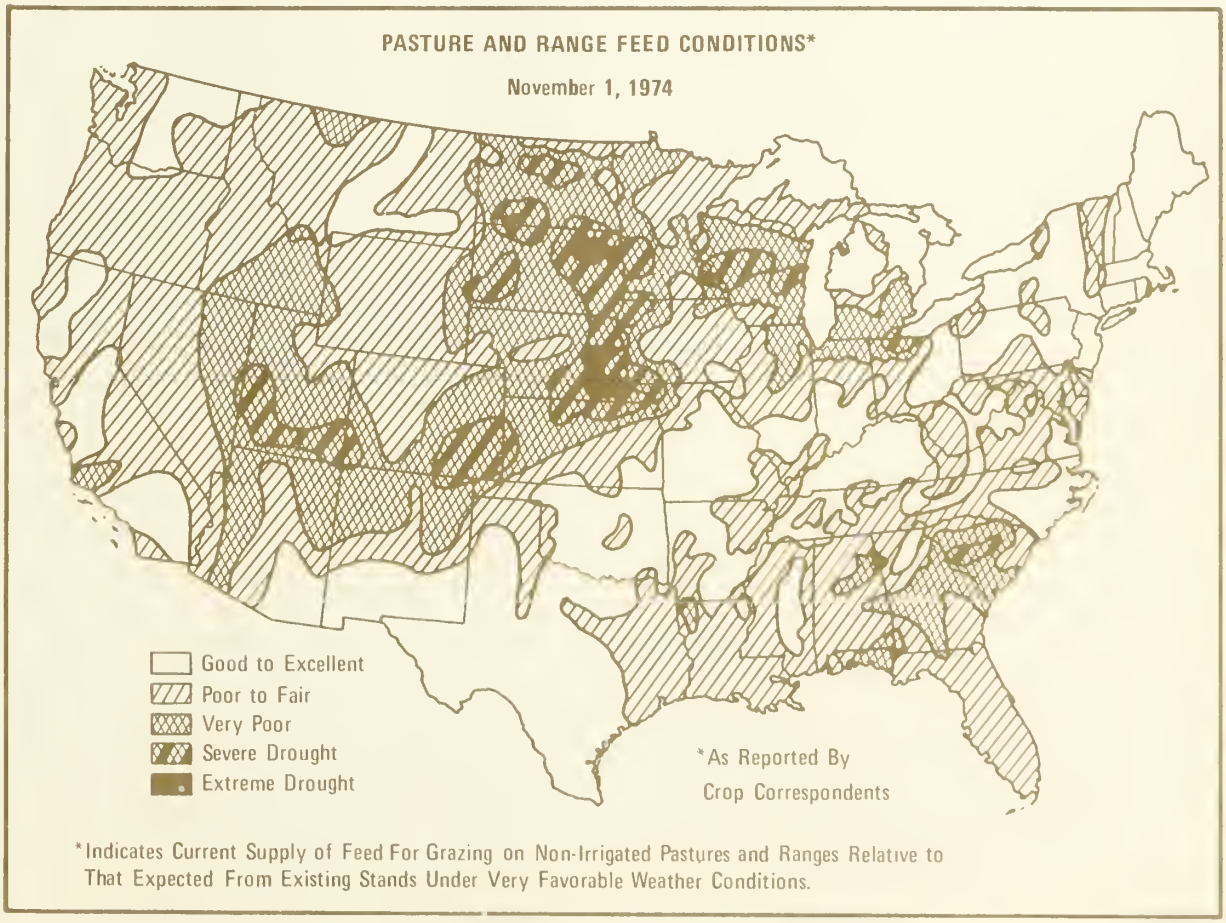
PASTURE AND RANGE CONDITION

Pasture and range feed condition information is issued in the monthly Crop Production report from April through December. The report indicates the current grazing condition on nonirrigated pastures and ranges throughout the 48 contiguous States. In April and December the reports cover only 37 States: excluded are the New England States, New York, Pennsylvania, Michigan, Wisconsin, and Minnesota.

The monthly indication of condition is obtained from a general survey of farmers and ranchers. In the 17 western range States, the general survey is combined with a special survey of livestock producers.

State Statistical Offices derive a straight average condition for each county and crop reporting district. Weights, by crop reporting districts, are established, using the most recent county estimates or the latest census numbers of all cows that have calved plus ewes 1 year old or older. To equate the roughage requirements of the ewe and the cow, the number of ewes is divided by 5, and the quotient is then added to the number of cows. State weighted average conditions are used to derive a national average condition.

Figure 15.—Example of a monthly map of pasture and range feed conditions in the United States.


PASTURE AND RANGE FEED CONDITIONS*
November 1, 1974
Good to Excellent
Poor to Fair
Very Poor
Severe Drought
Extreme Drought
*As Reported By
Crop Correspondents
*Indicates Current Supply of Feed For Grazing on Non-Irrigated Pastures and Ranges Relative to That Expected From Existing Stands Under Very Favorable Weather Conditions.

The condition percentages are rated as follows:

Percentage	*Rating*
Under 35	Extreme drought
35–49	Severe drought
50–64	Very poor
65–79	Poor to fair
80 or more	Good to excellent

State maps of county averages and isocondition lines are also prepared each reporting month by the SSO. In Washington, D.C., a U.S. map is made showing national pasture and range conditions (see figure 15).

WHEAT PASTURE

Information on the availability of wheat pasture for grazing livestock in the western two-thirds of Kansas and Oklahoma and the Texas Panhandle are provided in the October, November, and December Crop Production reports. Included is a summary table showing as of the first of the month: (1) Percentage of seeded wheat with sufficient growth to pasture; (2) percentage of seeded wheat being pastured; and (3) acres of wheat pasture required to carry a 400-pound calf. In addition, a map of the three-State area is also published, using isograms to delineate areas rated according to top growth of wheat available for grazing expressed in terms of good, fair, and poor.

The basis for the published data is a mailed survey of wheat farmers in the three-State area as of October 1, November 1, and December 1.

FIVE-YEAR REVISIONS

All livestock estimates are subject to further review and revision at 5-year intervals when U.S. census of agriculture data become available. ■

Chapter 8

DAIRY

INTRODUCTION

An annual report of the production of manufactured dairy products in 1917 opened USDA's statistical work in dairying. The series on milk production, utilization, and income from dairying were initiated in 1924. Although comprehensive weekly, monthly, and annual surveys now provide added coverage, a strong demand continues for more information, especially statistics relating to new products.

Currently, SRS provides data on: Farm production and disposition of milk; utilization of milk supplies; manufactured dairy products; and milk and product prices. The four categories involve different basic sources of survey data, survey methods, and estimating procedures.

Most of the survey data needed for estimating milk production and disposition are provided by dairy farmers. Information on the utilization of milk supplies is furnished mainly by milk and product-processing plants. Data on milk products come from manufacturing plants. Milk and product prices are obtained from both milk plants and manufacturers of dairy products.

Virtually all survey data are collected, summarized, and analyzed in State Statistical Offices (SSO's), where the State statisticians prepare reports and submit recommendations for Washington, D.C., review and inclusion in national reports. Official State and national estimates are set in Washington and issued by the Statistical Reporting Service on published release dates.

MILK COWS AND MILK PRODUCTION

Monthly surveys of milk producers are conducted in 34 major milk-producing States to determine estimates of number of milk cows and amount of milk produced. These States account for approximately 95 percent of the milk produced in the United States annually. Milk production estimates based on quarterly surveys are made in the 16 remaining States.

Table 9.—States in the monthly and quarterly milk-estimating program

Monthly States		Quarterly States
Alabama	Missouri	Alaska
Arkansas	Nebraska	Arizona
California	New York	Connecticut
Colorado	North Carolina	Delaware
Florida	North Dakota	Hawaii
Georgia	Ohio	Maine
Idaho	Oklahoma	Massachusetts
Illinois	Oregon	Montana
Indiana	Pennsylvania	Nevada
Iowa	South Dakota	New Hampshire
Kansas	Tennessee	New Jersey
Kentucky	Texas	New Mexico
Louisiana	Utah	Rhode Island
Maryland	Vermont	South Carolina
Michigan	Virginia	West Virginia
Minnesota	Washington	Wyoming
Mississippi	Wisconsin	

Preliminary estimates of milk production, production per cow, and the number of milk cows for the 34 States and the United States are published in the monthly report, Milk Production. For each monthly report, a group estimate is made for the 16 States reporting quarterly, based on

trends in the 34 States that report monthly. In addition, the January, April, July, and October reports contain estimates of number of milk cows and quarterly milk production for each of the 50 States. The February issue provides revised monthly production estimates for the preceding 2 years for the 34 States in the monthly program, and revised quarterly production estimates for the other 16 States. Also in February, estimates of annual average number of milk cows, annual production per cow, and total milk production are published for all States.

Preliminary estimates of milk production are the product of independent estimates of milk cow numbers and average production per cow.

Number of Milk Cows

Estimates of the number of milk cows are based primarily on indications from area frame enumerative surveys, and multiple-frame and nonprobability mail surveys. These surveys include indications for total cattle and calf inventories on January 1 and July 1. Milk cows that have calved constitute one of the eight classes of cattle and calves estimated from these surveys.

In June and December, area frame enumerative surveys are conducted in the 48 contiguous States to provide estimates of number of milk cows that have calved in each State. In addition, July 1 and January 1 multiple-frame cattle surveys are conducted in the 28 major cattle States (see chapter 2). In the remaining 22 States, nonprobability cattle inventory surveys are conducted by mail for January 1.

Each January an estimate of milk cow numbers is made for each State; in July, estimates are made only for the 28 major cattle States. These annual and semiannual inventory estimates become benchmarks to which the monthly and quarterly estimates of milk cows are tied.

Monthly milk production surveys in the 34 major milk-producing States and the quarterly milk production surveys in 16 States are nonprobability mail surveys that reflect the change in milk cow numbers between the major January 1 and July 1 cattle inventory surveys and also provide an indication of milk produced per cow. In each State a sample is selected and questionnaires are mailed around the first of each month or quarter to the dairymen in the sample. Each month, reports are received from about 2 percent of the Nation's milk cow farms that account for 5 percent of the milk cow population. Individual reports are summarized by size groups to reduce sample variability. The number of groups may vary by State, but three or four usually suffice. The basis for this stratification is the number of milk cows in the herd, including dry cows.

Three indications of milk cow numbers are obtained by the following methods:

1. Ratio-per-farm expansion. Derived by multiplying the average number of milk cows per farm reported in each stratum by the estimated number of milk cow farms in each stratum. Individual stratum expansions are added to form a State total.

2. Identical expansion. Obtained by matching current survey reports with reports from the same farm for the previous month or quarter. After "identical" reports have been tabulated by strata, a percentage change in number of milk cows is calculated for each stratum. This indicated percentage change multiplied by the estimated number of milk cows on farms the previous month or quarter in each stratum is an indication of the current number of milk cows.

3. Ratio-to-base expansion. This indication of milk cow numbers is similar to the identical expansion in that current reports are matched with corresponding reports from a base period. Since all States conduct a large-scale cattle inventory survey the first of each year, and these estimates of milk cows by strata are more precise, current reports are matched with January 1 milk production reports; i.e., January 1 is designated as the base period. The indicated change from the January 1 base in each stratum is applied to the estimated number of cows in each stratum on January 1. The sum of these stratum expansions is an indication of milk cow numbers for the current month or quarter.

The ratio-per-farm, identical, and ratio-to-base expansions are plotted on a time-series chart (see figure 16). These indications are analyzed and interpreted in the State Statistical Offices, and monthly or quarterly estimates of number of milk cows are made. When State reports are received in Washington, D.C., individual State estimates of number of milk cows are combined and ana-

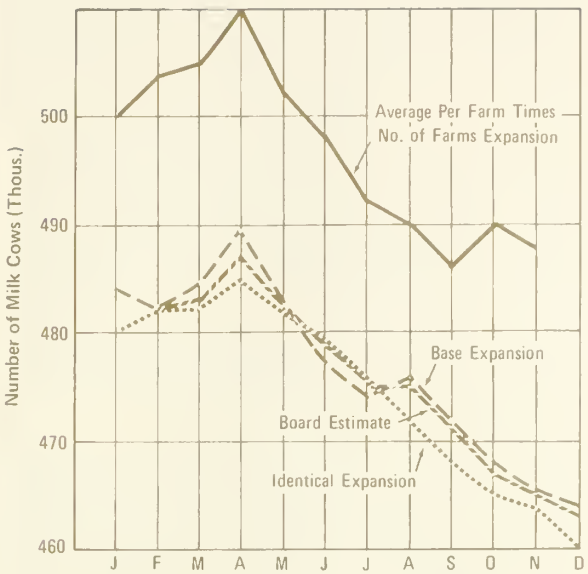


Figure 16.—Example of a time-series chart used to interpret average per farm, identical, and base milk cow expansions.

lyzed and estimates are set on a regional and national basis. The interpretation of regional indications is compared with the sum of the statisticians' estimates for that area. Changes in State estimates are then made, if necessary.

The annual average number of milk cows by States is a simple average of the monthly estimates for 34 States so reporting, and an average of the quarterly estimates for 16 States. The national annual average is the sum of the State annual averages.

Production Per Milk Cow

Milk production in each State follows a seasonal pattern, which reflects the proportion of cows in milk, pasture conditions, feeding practices, and weather conditions. Because of seasonal variations in output per cow, it is necessary to obtain indications of production per cow at frequent intervals throughout the year in the major milk production States.

Survey indications of milk production per cow are derived from producers' response to questions about (1) all milk cows on their farms the preceding day, both dry and in milk; and (2) milk produced on their farms the preceding day. The number of pounds of milk obtained from item (2) is divided by the number of milk cows reported in item (1) to derive the indicated rate of production per cow in each size stratum. This indicated rate per stratum is weighted by the estimated number of milk cows in each stratum in order to determine an average daily rate for the State.

To estimate monthly production per cow in the 34 major States, the weighted first-of-the-month daily rate from the current survey and previous survey are combined to determine an average daily rate for the month. This average is multiplied by the number of days in the month to provide an indication of the monthly rate. The procedure for computing rate per cow in the 34 States reporting monthly is below:

Jan. 1 Reported daily rate per cow	Feb. 1 Reported daily rate per cow	Average 2 dates	No. days in January	Indicated monthly rate per cow
29.0 lbs.	30.0 lbs.	29.5 lbs.	31	915 lbs.

In the 16 States reporting quarterly, the computation of an indicated quarterly rate per cow utilizes the reported rates at the beginning of the current and previous quarters and estimated rates for the two intervening first-of-the-month dates. The procedure is illustrated below:

Jan. 1 Reported daily rate	Feb. 1 Estimated rate	March 1 Estimated rate	April 1 Reported rate	Average 4 dates	No. days in quarter	Indicated quarterly rate per cow
31.0 lbs.	32.4 lbs.	32.5 lbs.	34.8 lbs.	32.7 lbs.	90	2,943 lbs.

The indicated monthly or quarterly rate from the survey is interpreted by means of a regression chart to establish the preliminary rates per cow. Survey indications for the corresponding months or quarters in previous years are plotted against final estimates of production per cow, which are based on more complete data. As in the case of number of milk cows, rate-per-cow indications are analyzed on a regional and national basis. The sum of individual State statisticians' estimates within a region and the regional interpretation are reconciled if there is any difference between them.

Total Milk Production

Estimates of total milk production in the current month are obtained by multiplying estimated number of milk cows by the estimated monthly rate of production per cow. Estimates of production are revised by comparison with the trend for recent months and seasonal changes in production.

Supplemental check data on earlier months' milk production are available for most States, and are helpful in keeping the estimates at a proper level. The nature and source of available monthly check data vary by States and include the following:

1. State milk commission reports on plant receipts of milk from producers within the State.
2. Milk receipts from producers at plants regulated by Federal marketing orders. In some States, these receipts represent a large percentage of all milk produced. In those markets where milk is received from several States, receipts are allocated to the States involved.
3. Milk receipts at a sample of plants compared with receipts a year earlier and a month earlier.
4. Estimated change from a year earlier in milk (milk equivalents) used for the manufacture of butter and American cheese. In several States these products use a large percentage of the total milk produced.

In February, State estimates of monthly milk production for the two preceding years are open to revision because monthly and quarterly milk cow numbers are reappraised on the basis of indications from the cattle inventory surveys. Monthly and annual milk production estimates for the second year preceding are revised to bring them into line with more complete check data (monthly plant receipts of milk and cream) obtained from the annual dairy plant survey in each State. By this time, a complete enumeration of production of manufactured dairy products is also available. Data from the plant surveys are not available for all months of the year just past, therefore February revisions of monthly milk production estimates for the preceding year are based on less complete check data, except where complete data on monthly plant receipts of milk for the previous year are available from State agencies or other sources.

For annual revisions in February, estimates are made for each of the two preceding years of the quantity of milk sold as whole milk and cream and the quantity used on farms. The basis for these estimates is described in sections on farm disposition and use of milk.

As data become available from the census of agriculture, milk production estimates may be revised for the five years preceding the current agricultural census. However, for most States, total milk production is established in annual revisions, based primarily on check data on plant receipts. Census data do provide an indication of the number of milk cows in each State, as well as the number of farmers keeping milk cows and delivering milk.

Grain and Other Concentrates Fed to Milk Cows

The average amount of grain and other concentrates fed daily to milk cows is published by States, based on surveys on the first of January, April, July, and October. The reported quantities fed are totaled for each stratum and divided by the number of milk cows (including those not being fed concentrates) reported in each stratum, to obtain an average feeding rate per cow. The stratum rates are weighted to form a State average. The computed rate includes concentrates fed to dry cows as well as to those being milked.

Information on the kinds of concentrates fed to milk cows is reported by producers in the October 1 milk production survey. The questionnaire, in addition to asking about the total amount of concentrates fed, also asks reporters to show

the breakdown of concentrates fed the preceding day by kinds of grain, commercial mixed feed or supplement, and other kinds of concentrates. These data are published annually by States.

Value of Concentrates Fed

Estimates of the average value per hundredweight of concentrates fed to milk cows are published monthly by geographic regions. Regional estimates are based on quarterly survey indications of the average value of concentrates fed. The reported values include homegrown grains valued at current local prices received by farmers and commercial concentrates valued at prices paid by dairymen. For those months between the quarterly surveys, ration values are projected with consideration of changes in grain and other concentrate prices reported by dealers in the monthly surveys of prices paid for feed (see chapter 10).

Milk-Feed Price Ratio

Milk-feed price ratios are published monthly by geographic regions in the Agricultural Prices report to show the current relationship between prices received by farmers for milk and the value of concentrate fed to milk cows. Ratios are computed by dividing the estimated current price per hundredweight received by farmers for milk by the estimated value of concentrate per hundredweight. Regional estimates of the value of concentrates fed are averaged to form a U.S. estimate, using the amounts of concentrate fed in each ration as weights. State estimates of amounts fed are the product of number of milk cows and annual feeding rates.

Farm Disposition of Milk

Estimates of farm disposition of milk produced are made annually for each State. Separate estimates are made of milk fed to calves, milk used in farm households, milk sold to plants and dealers, and milk retailed by farrmers. The farm value of all milk produced is developed from these disposition estimates by application of annual average prices.

Milk Used on Farms

Estimates of amount of milk used on farms are based primarily on indications from disposition questions on the April 1 and October 1 milk production surveys. The respondent reports the quantity of milk from the preceding day's production fed to calves, used as food, for buttermaking, and for other purposes in farm households. The quantities reported are computed as a percentage of all milk produced on reporting farms the day before the survey. Percentages are computed by strata, which are then weighted by the indicated total milk produced in each size group to arrive at a percentage for the State. The average of the weighted percentages from the April 1 and October 1 surveys is applied to the annual milk production estimate for each State. Milk sucked by calves is not included in the estimate of milk fed to calves or that of total milk production.

Whole Milk and Cream Sold to Plants

Estimates of amount of whole milk sold to plants are based primarily on receipts reported in the annual dairy plant survey in each State. Complete data on receipts of fluid grade milk are available in States where monthly reports are required by a State regulatory agency or by administrators of Federal milk marketing orders. In April, when preliminary estimates of milk sold to plants are published for the preceding year, receipt data are not available for all States from the annual plant survey. When data are lacking, preliminary estimates of milk sold to plants are based on the percentage change from a year earlier. In important dairy manufacturing States, the change in the quantities of manufactured dairy products produced from one year to the next furnishes an indication of the percentage change. Preliminary estimates are revised, if necessary, in the disposition report a year later, when more complete data are available.

Milk Retailed by Farmers

Estimates are made of amount of milk retailed by farmers directly to consumers at the farm or on retail routes. The estimate include quantities of milk sold to neighbors as well as milk marketed by producer-distributors from their own herds. Milk produced by herds kept by public and private institutions is also included in this category. In several States, regulatory agencies require

reports on sales by producer-distributors; such reports are useful in making estimates of milk retailed by farmers.

Farm Income and Value of Milk and Cream

Separate estimates are made of cash received by farmers for whole milk sold to plants, for farm-separated cream sold to plants, and for milk retailed by farmers. Estimated prices received for each category are in terms of the prevailing unit of sale: per hundredweight for milk sold to plants, per pound of fat for cream sold to plants, and per quart for milk retailed by farmers. Estimated annual sales are expressed in these units and multiplied by annual average prices to obtain cash receipts from each method of marketing.

Total cash receipts from farm marketings of milk and cream are the sum of receipts computed for each category of sales. Gross income is the sum of total cash receipts from marketings of milk and cream plus the value of milk used on the farms where it is produced.

UTILIZATION OF MILK (MILK EQUIVALENTS)

After the end of each year, a balance-sheet approach is used to check the accuracy of the estimated total milk production during the preceding year.

The procedure is to calculate (1) the whole-milk equivalents of all dairy products manufactured in the United States, (2) the whole-milk equivalents of net imports or exports of dairy products, (3) the whole-milk equivalents of manufactured dairy products in cold storage at the beginning and end of the marketing year, (4) the milk used on farms where produced and (5) fluid milk and cream sold to plants and directly to consumers. The latter is primarily a summary tabulation of fluid-milk sales in Federal milk market order statistics, State milk market orders, and plant survey data provided by State Statistical Offices.

If the calculated milk equivalents depart materially from estimated total milk production, the milk production estimates are again reviewed. The balance sheet is published each April in a report, Milk Production, Disposition and Income.

MANUFACTURED DAIRY PRODUCTS

The U.S. Department of Agriculture began providing annual statistics on the production of manufactured dairy products in 1917, because milk supplies were shifting rapidly to large processing plants rather than being used for farm-produced cream, butter, and cheese, and for home deliveries of milk by farmers. Annual surveys have been conducted ever since, with the advent of monthly reports occurring during World War II. SRS now provides monthly production statistics for 25 major dairy products, and an annual report for 54 separate commodities.

Monthly Survey of Manufactured Dairy Products

Sample data for estimating monthly production of manufactured dairy products are obtained in most States by a mail survey of processing plants.

The sample is drawn from a complete list of plants in each State; the list is constructed with information from various State licensing and inspection agencies, and from dairy magazines and periodicals, which often provide names and locations of plants going into and out of operation during the year. Lists are continually updated to keep abreast of processing plant numbers.

While reliable monthly estimates are possible from a sample of plants, an increasing number of State Statistical Offices are making a complete enumeration each month, especially in States with few plants. This eliminates the need to ask the plant for annual statistics at the end of the year.

Laws in many States require State agencies to collect statistics as a part of a dairy plant licensing system. Such laws are helpful in obtaining statistics from all plants. In those cases where dairy manufacturing plants operate in more than one State, data are obtained from the headquarters or central office and forwarded by the SSO located in the headquarters State to other SSO's where plants are located.

Furthermore, SRS and the Agricultural Marketing Service have a cooperative program whereby data on selected dairy products reported to milk market administrators are forwarded to SSO's for compiling the monthly and annual product reports. For example, under each Federal market order, regulated dairy plants are required to file

monthly reports with the market administrator's office, listing the utilization of Grade A milk in specified products. The SSO's arrangement with the market administrator generally requires a modification in the format of the Federal market order report form so that the dairy plants can report the quantity of finished product—butter, cheese, cottage cheese, frozen desserts, and mixes. This joint reporting system eliminates the need for SSO's to send a separate inquiry to handlers for their production data.

Plants that produce butter and cheese usually do not produce frozen products or cottage cheese. For each manufactured product, an adequate number of plants producing that product are included in the sample survey. Reliable estimates depend on the coverage of the sample plants for each product. A special effort is made to obtain data from all large plants each month, and a decreasing proportion of the plants is surveyed as plant size diminishes. Survey questionnaires are mailed to the plants about the 25th of each month.

Current monthly samples include more than one-half of the plants in the list and usually account for 70 to 90 percent of total production of the major dairy products. Followup telephone calls, personal contacts, second requests, or other means are employed to maintain an adequate survey response each month.

All questionnaires returned to SSO's are reviewed and summarized. Special editing procedures include comparisons of milk receipts with manufactured products, and the report for each product with the report for the previous month and/or the previous year. Particular attention is given to the seasonal production pattern of each product. Any unusual change is carefully reviewed. This is especially important when a product is reported for one month and not for another. If it appears that data may be incorrectly reported, the plant is called for clarification. Data reported on a fiscal-month basis are converted to a calendar-month total before summarization.

Monthly estimates are computed from indications of change, obtained by matching current survey reports with reports from the sample plants for the previous month and identical plants reporting for the same month a year earlier. The methods employed to provide these indications are discussed in more detail in chapter 2. For butter and American cheese, a third indication is obtained from weekly production data converted to monthly totals for each plant and for each State. Monthly totals converted from weekly plant data are often used to augment the monthly sample.

When later reports indicate a significant error in the preliminary estimate for the previous month, a revision is made in the following month. These monthly revisions are not published until the following year, but they do provide SRS with a more accurate base for applying the current month-to-month indication. The year-to-year indication is applied to the last published monthly estimate of a year earlier.

With these indications, each SSO recommends a production estimate for each product, giving proper consideration to size of the sample and the usual reliability of each indication. The recommendations are submitted to the Washington, D.C., headquarters for review and publication.

Preliminary monthly estimates are released around the end of each month following the month to which they relate. Major products are reported on a State and national basis, but only national totals are published for the less important dairy products. The monthly estimates include butter, cheese by types, cottage cheese, canned evaporated and condensed whole milk, dry milk products, dry buttermilk, dry whey, condensed whey, ice cream, ice milk, sherbet and Mellorine-type frozen desserts.

Annual Survey of Manufactured Dairy Products

SSO's which do not obtain monthly data from all plants conduct an annual survey to collect information, by months, from missing plants. This annual year-end questionnaire goes only to dairy plants that did not report monthly. These data are combined with the monthly survey data to provide complete coverage of all manufacturing dairy plants. Most plants readily report their production each month or at the end of the year. For those not providing data, an estimate is made at the end of the year, based on reports for previous years and other general information.

The annual report, Production of Manufactured Dairy Products, is published in Washington, D.C., in June, and contains production data from all

plants for all leading dairy products, by months and by States. These products include: Butter, the principal kinds of cheese, various types of evaporated and condensed milk products, several kinds of dry milk products, whey products, processed cheese foods and spreads, major types of frozen products, such as ice cream, ice milk, sherbet and Mellorine, and mixes for these frozen products. Data are obtained and published for water ices produced in dairy plants, because they are somewhat competitive with frozen dairy products. Data on number of plants producing one or more dairy products are also published.

The annual publication also presents, by States, the calculated quantities of milk used in specified products, on a whole milk and skim milk equivalent basis. Whole milk equivalent is the quantity of producer milk at average milk-fat content required to supply the milk fat used in a dairy product. As an example, 300,000 pounds of butter having 80 percent of milk fat is equivalent to 6,400,000 pounds of milk with an average milk-fat content of 3.75 percent:

$300{,}000 \times 0.80 = 240{,}000$ pounds of milk fat
$240{,}000 \div 0.0375 = 6{,}400{,}000$ pounds of milk

Skim milk equivalent is the quantity of skim milk utilized in the production of the various nonfat and buttermilk products.

Total utilization of milk, compared with production, is usually expressed in milk equivalent terms.

Weekly Estimates of Butter and American Cheese

Weekly production estimates of butter and American cheese in the United States were started when the Chicago Dairy Office of SRS was established in the early 1940's to meet statistical requirements of the War Food Administration. In response to numerous requests from the dairy industry, they were continued after the war food orders expired. The information provides the industry and the public with needed data for effective pricing of milk, butter, and cheese in market channels and on commodity exchanges.

Since April 1972, the weekly surveys, estimates, and releases have been processed in the Wisconsin SSO, which is near the production and trade center of manufactured dairy products.

Weekly production data on butter and American cheese are obtained from a large sample of butter and cheese factories in the United States. The sample allocation for both commodities is planned to provide estimates with an error not greater than 2 percent of the final published figures on butter and American cheese production. The sample used to estimate butter output contains about 57 percent of the total number of factories in the United States producing 90 percent of the butter. The American-cheese sample includes about 50 percent of the plants, with 80 percent of the production.

Weekly quantitative estimates are generated by a unique procedure of combining seasonal changes of production with a ratio-to-base estimator in each State. The estimator is the ratio of each week's production of all plants in the sample to the total average weekly production determined from the latest enumeration. Thus all plants in the selected sample must be included in the ratio-to-base estimator each week. Estimates for those plants in the sample that have not reported in the survey period are made by applying the seasonal change in production noted in current sample returns when these are compared with the preceding week's returns from the same plants. However, if the indicated seasonal change exceeds 6 percent or falls below 6 percent of the figures for the previous week, the change is limited, for the missing plants, to these parameters.

The generated State quantitative estimates are added together for regional totals and into a total for the United States. Then percentage changes are computed by dividing the week's production estimate by the revised estimated production of the preceding week and the estimates of 1 year earlier and 2 years earlier. Revised current weekly estimates plus those for the six preceding weeks are updated each week on the basis of the late reports received.

About one-fifth of the sample plants report the pounds of milk used in the production of cheese rather than the pounds of cheese manufactured, because the cheese has not been weighed at the time the SRS report form must be mailed. SRS converts the amount of milk reported to pounds of cheese before processing by assuming that 10 pounds of milk will produce 1 pound of cheese.

Another statistical program converts the weekly estimates to monthly totals by plants, by States, and by regions (with national totals) for use by SSO's in making monthly estimates. Individual plant data from the weekly program are used to augment monthly samples or as a substitute for late monthly returns. The expanded State totals provide another indication of production within each State. Besides this, the two sets of sample plant data (weekly converted and monthly reported) are used to detect any reporting errors that may exist in either set of data.

Weekly estimates of production of butter for the 7-day period ending each Thursday are released at 9:00 a.m. on the following Tuesday, and those for cheese at 9:00 a.m. on Wednesday. Published reports include quantitative estimates of national production, and regional figures of percentage change from the preceding week, from the corresponding week in the previous year, and from the same week 2 years earlier.

Prices Paid for Milk of Manufacturing Grade Used for Butter, Cheese, and Condensery Products

Prices paid to farmers for manufacturing-grade milk used to produce butter, powder, various cheese types, all-cheese and canned evaporated milk are obtained monthly from butter plants, cheese factories, and condenseries. SSO's collect information on milk prices and the production of manufactured dairy products by mail questionnaire. Only plants using about 65 percent or more of their milk for a particular product are classified and used in the sample for each specific manufacturing price category. SRS has determined that limiting the sample to the 65-percent level will provide reasonably accurate milk prices and tests for each utilization.

Milk questionnaire responses concerning quantity of milk received, total pounds of fat in the milk, and total dollars paid for milk delivered to the plant are listed and summarized in SSO's. In a few instances, estimates are made for missing reports when the State average would be materially influenced by omitting data for a plant that normally reports.

The price per 100 pounds of milk, fat test, and price per pound of fat in milk are calculated for each mail response to help detect reporting errors before summaries are made.

Milk receipts, pounds of fat, and dollars received are totaled from the sample responses and then carried to summary sheets, on which State averages are computed. The State averages of milk fat are carefully reviewed by plotting on a monthly line chart to determine and adjust for any sharp departures from historical seasonal trends. Average prices of both milk and price per pound of fat are also reviewed in relation to changes in the price of butter, nonfat dry milk, cheese, and evaporated milk. Normally, the price of manufacturing-grade milk moves in the same direction as product prices.

States submit their recommendations to Washington, D.C., for further review and processing into a national report. Adopted State prices and milk fat tests for each product usage are weighted by the quantities of milk used for these products, the quantities being obtained from the latest annual enumeration of milk utilization. State, regional (for condensery products), and U.S. estimates are published monthly in Dairy Products for the preceding month.

Monthly estimates are considered preliminary and subject to revisions. Revised monthly estimates and annual data are published in July of the following year in Dairy Products.

Four-State-Area Nonfat Dry Milk Prices

The four-State-area nonfat dry milk average sale price—often referred to as the Chicago-area nonfat dry milk price—is one of the determining factors in the price paid to farmers for milk under some Federal and State milk market orders.

The price is established from monthly survey data which note the average net price received by manufacturers for sales of nonfat dry milk solids. The surveys are confined to plants in Iowa, Michigan, Minnesota and Wisconsin—important milk-producing States that represent an area of highly competitive marketings. Prices relate only to shipments of spray-process nonfat dry milk for human consumption f.o.b. factory after deduction of freight paid by processors and after discounts to wholesales.

The survey covers shipments from the 26th

of one month through the 25th of the next. This period is used instead of a calendar month to allow time for surveying plants and to compute the average price for release, which is usually on the fifth day of the month following the end of the reporting period.

Questionnaires are mailed to all spray-type drying plants in the four-State area. About half of the plants respond on a monthly basis, representing 70 percent or more of the production in volume of sales.

The SSO's review the returned questionnaires for completeness, and then mail them to Washington, D.C., for processing. The data are edited, and items that represent less than "carlot" sales (about 20,000 pounds), and prices which appear erroneous, are deleted. Shipments and prices are listed according to sales made to (a) Government agencies, (b) wholesalers, (c) direct users, and (d) others. The purpose of the four groupings is to make it easier for the respondent to report the sales price. Prices reported by individual plants are weighted by all types of sales to compute the weighted average monthly sale price.

The price is released through the Agricultural Marketing Services dairy market news offices and the Wisconsin State Statistical Office at 10:00 a.m. eastern time on the release date.

Shipments, Prices, and Stocks of Dry Milk Products

The monthly Dairy Products report includes U.S. estimates of manufacturers' selling prices, shipments, and end-of-month stocks for nonfat dry milk for human food, dry skim milk for animal feed, dry buttermilk for human food, dry buttermilk for animal feed, and dry whole milk (bulk goods).

SSO's collect the basic data from central sales office headquarters and from individual plants within their States. Some multiple-unit companies and cooperatives with offices in several States report their entire operations from a central office, which facilitates the collection and processing of the data. The data are collected primarily by a mail questionnaire, with followup telephone calls to nonrespondents.

Statisticians examine the returned questionnaires for completeness, and then forward them to Washington, D.C., for editing and processing. Reported prices which fall outside the range of a normal distribution array are excluded from the summaries. U.S. totals of shipments, end-of-month stocks, and average price per pound are computed and published for each product. Also, manufacturers' shipments at specified price ranges are presented in the monthly report.

Revised totals of stocks and average prices based upon a near-complete enumeration are published annually in the January issue of Dairy Products. The revised data are reasonably close to the preliminary estimates published each month.

Prices and Stocks of Evaporated Whole Milk

Information on prices manufacturers receive (carlot basis) for canned evaporated whole milk and on end-of-month stocks of evaporated and condensed milk are collected monthly from condenseries by mail questionnaires, with telephone followup to nonrespondents.

Statisticians review the returns for completeness and then forward them to Washington, D.C., for processing estimates and publication in Dairy Products. The estimates are reported for a range of cash price quotations for cases of 48 cans of 14½ ounces, by regions and for the Nation.

Prices Received by Farmers for Manufacturing-Grade Milk in Minnesota and Wisconsin

The Statistical Reporting Service provides monthly estimates of the average price received by farmers and the average milk-fat test for milk of manufacturing grade in the two-State (Minnesota-Wisconsin) area. This is a special series (M-W prices) that is used to price fluid and surplus Grade A milk each month in Federal milk marketing orders.

Minnesota and Wisconsin produce over half of the manufacturing-grade milk marketed in the United States and as a result there is competition for the supply within the two States to the extent that the price is considered to represent the market value of milk utilized in the production of cheese, butter and its byproducts, and varied products.

The M-W estimate is an average price for all milk of manufacturing grade delivered in bulk

tanks and in eans f.o.b. plant or receiving station, before hauling costs are dedueted. It includes bulk-tank, quantity, or other premiums paid to produeers, but exeludes hauling subsidies. The priee and test estimates for a given month are derived from two faetors: (1) The estimated average priee and test for the base month, whieh is the month preeeding that to which the M-W priee estimate relates, and (2) an estimate of change from the base month to the month to whieh the M-W priee estimate relates.

The base-month priee and test are based on reports from about 230 plants in Wiseonsin and about 120 plants in Minnesota that purehase approximately 50 pereent of all manufaeturing-grade milk sold in Wisconsin and Minnesota. These reports give the total pounds of manufacturing-grade milk reeeived from produeers, total pounds of milk fat in the milk, and total dollars paid to produeers by proeessing plants.

The 350 plants in the base-month sample are well distributed geographieally over both States and represent all the major types of proeessing plants using manufaeturing-grade milk. At the end of the year, reports from all manufaeturing grade milk plants in eaeh State indieate close agreement with the monthly priees derived from the 350 plants.

The estimate of ehange from the base month to the month to which the M-W price estimate relates is based primarily on reports from a sample of 110 plants seleeted in the two States (about 40 plants in Minnesota and 70 in Wiseonsin). These plant reports are also evaluated in terms of ehanges from the base month in wholesale priees of manufaetured dairy produets and historieal priee and fat-test relations. Estimated changes in priec and fat tcst are applied to the State average for the base month to estimatc price and fat test for each State for the month to which the estimates relate.

Plants in Minnesota and Wiseonsin are classified into three major produet groups aeeording to the proportion of manufaeturing-gradc milk purehased for cheese, for butter and its by-produets, and for varied products. In both Minnesota and Wiseonsin, the varied-produets group consists mostly of plants whieh make butter, eheese, or other produets in sueh proportions that they cannot bc elearly elassified in any one speeifie group, sueh as primarily buttermaking plants, primarily eheesemaking plants, or eondenseries.

The pereentages of milk for eaeh use are used as weights for combining reported priee and milk-fat test data by groups for the monthly manufaeturing-grade average priee and milk-fat estimates in eaeh State. The estimated monthly price and fat test for Minnesota and Wiseonsin are weighted together by the total quantity of manufacturing-grade milk purehased from farmers in eaeh State. The pereentages are based on final plant enumerations for the previous year and are ehanged onee each year when enumerated data beeome available.

Data for the M-W price series are colleeted from the 110-plant sample, using a questionnaire mailed near the elose of eaeh month. This inquiry obtains information for the base month and for the first half of the sueeeeding month relating to: (1) Quantity of manufacturing-grade milk purehased, (2) quantity of fat ineluded, (3) dollars paid, (4) average priee at average test, and (5) related information, sueh as quantities purchased in bulk and in eans, the base price for milk with 3.5 pereent fat, and point differentials for varying amounts of fat. Space also is provided on the inquiry for the plant manager's best estimate of the average fat test and milk price for the last half of the month to whieh the M-W estimate relates.

The Minnesota-Wisconsin price speeified for use in Federal milk marketing orders is converted to a basis of 3.5 pereent of milk fat. Priees, at average milk-fat test, are converted to a 3.5-pereent basis by using a milk-fat differential per point (1/10 of 1 pereent) that is ealculated by multiplying the average priee of Grade A (92-seore) butter at Chicago by 0.120.

The basie and preliminary data needed for the preparation of the two-State average priee and fat test are eolleeted, summarized, and analyzed by the State Statistieal Offiees in Minnesota and Wiseonsin. The data are forwarded to Washington, D.C. for final review and consolidated into a Minnesota-Wiseonsin priee. The report is issued about the 5th of eaeh month from the Wisconsin SSO and is also published and released by Agrieultural Marketing Serviee's dairy market news serviee. ■

Chapter 9

POULTRY

INTRODUCTION

Statistical Reporting Service estimates of the U.S. poultry industry provide farmers, agribusinessmen, government planners, and others with timely information on current and potential supplies and production.

There are six main categories of estimates: (1) Layer numbers and egg production, monthly, (2) broiler and turkey production, annually, (3) hatchery production, weekly and monthly, (4) number of chickens and turkeys raised, annually, (5) inventory and value estimates, annually, and (6) miscellaneous monthly reports on poultry slaughter, egg products, pullet chicks placed in hatchery supply flocks by primary breeders, number of chickens and turkeys blood-tested for pullorum-typhoid diseases, and forced molting of layers.

This comprehensive poultry estimating program had its beginning in 1919 with questionnaires sent to a small sample of poultry farmers each January. Between 1937 and the mid-1940's, intensive studies were made of poultry statistics, including inventory numbers, chicken and egg production, disposition, marketing records, commercial hatchery production, and other data. Historical series of estimates of chickens by States extending back to 1924 and estimates for the United States back to 1909 were issued in 1950. Estimates of inventory numbers and production of turkeys date back to 1929.

The preliminary weekly, monthly, and annual poultry estimates are based primarily on sample surveys. However, some items are based on nearly complete enumerations. Check data, along with the original survey results, are used in reviewing and, if necessary, revising preliminary estimates. Check data include the number of birds slaughtered in commercial plants, shipments, State farm census, and other data. U.S. census of agriculture figures available every 5 years provide additional check data.

CHICKENS AND EGGS

Inventory estimates by States and for the Nation are made of chickens on farms December 1 each year. These estimates are broken down into four main groups: (1) Hens and pullets of laying age, (2) pullets 3 months old or older but not of laying age, (3) pullets and pullet chicks under 3 months of age, and (4) other chickens. In addition, the hens and pullets of laying age are broken down into hens 1 year old or older, and laying pullets. Estimates are also made of the average value per bird and the total value of chickens on farms December 1.

Monthly estimates are made of the number of layers on hand, the rate of lay, and the number of eggs produced for 33 States and the United States. For each monthly report, Eggs, Chickens, and Turkeys, a group estimate is made for the 17 States that report quarterly (see table 10). The December, March, June, and September reports contain estimates of layers and quarterly egg production for each of the 50 States. Also on December 1, March 1, June 1, and September 1, estimates are made by region of the number of pullets 3 months old or older but not yet of laying age. These are combined with the number of hens and pullets of laying age to provide an esti-

Table 10.—States in the monthly and quarterly egg production estimating program, in 1974

Monthly estimates		Quarterly estimates
Alabama	Missouri	Alaska
Arkansas	Nebraska	Arizona
California	New Jersey	Colorado
Connecticut	New York	Delaware
Florida	North Carolina	Hawaii
Georgia	Ohio	Idaho
Illinois	Oklahoma	Maryland
Indiana	Oregon	Montana
Iowa	Pennsylvania	Nevada
Kansas	South Carolina	New Hampshire
Kentucky	South Dakota	New Mexico
Louisiana	Tennessee	North Dakota
Maine	Texas	Rhode Island
Massachusetts	Virginia	Utah
Michigan	Washington	Vermont
Minnesota	Wisconsin	West Virginia
Mississippi		Wyoming

mate of potential layers for coming months. Other monthly estimates are: the percentage of layers being force-molted and percentage with molt completed in the 17 States where this practice is most prevalent, the number of egg-type chicks hatched in commercial hatcheries during the month, the number of egg-type eggs in incubators on the first of the month, the number of egg-type pullet chicks placed in hatchery supply flocks by primary breeders, and the number of chickens tested for pullorum-typhoid diseases reported by official State testing agencies during the month.

Estimates of the number of chickens raised, sold, and lost by death during the year, and the number of eggs produced and sold are made in early April each year. Also, estimates of home consumption by producers of both chickens and eggs are included. Season average prices received for chickens and eggs sold are estimated, and estimates of cash receipts, value of home consumption, and gross income from chickens and eggs are prepared.

Annual Inventory and Value

The December inventory estimates include all layers and replacement chickens used to produce table or hatching eggs. This includes all egg-type chickens and that portion of broiler-type hens, pullets and cockerels used for production of eggs. Since they are not commercial broilers, egg-type male chicks raised along with pullets for laying flock replacements are included, even though the males are used for meat. This would also include the laying flock for production of Rock Cornish eggs. Chickens produced exclusively for meat, such as broilers, fryers, roasters, capons, Rock Cornish, and some heavy pullets are not included in these estimates.

The average value per bird is obtained from the December survey of chicken operations. This average value per bird, multiplied by the total number of chickens on hand December 1, gives the total value of chickens.

The level of the December 1 inventory estimates in most States is based primarily on direct expansions from stratified probability area frame surveys and ratios of matched reports from nonprobability mail list frame sample surveys of chicken operations. Three States (Alabama, Arkansas, and Virginia) utilize a probability multiple-frame sample survey. Many other States, using the nonprobability mail list frame survey, obtain enumerations of over 80 percent of the birds in their universe. Indications of year-to-year changes in numbers from these surveys, along with hatchery and slaughter data, are also used in establishing annual estimates.

Sample units for these surveys are selected from lists of chicken operators prepared each fall. Each State attempts to obtain a response from all of the very large chicken operations and from a representative sample of smaller operations.

In estimating December 1 inventory numbers, two main indications are computed: (1) A control data expansion and (2) an "identical" ratio obtained by comparing current data with data reported a year earlier for matched sampling units. The expansion is computed by size-group strata, using an expansion factor $\frac{N}{n}$ times the number of birds reported in each stratum, (N = control data universe; n = sample size). Summation of these stratum expansions yields the State direct expansion. The U.S. direct expansion is a summation of the State direct expansions. The identical or matched-sample technique provides an indication of the change in numbers reported by the same producer in both years; current questionnaires from producers are matched with questionnaires received from the same producers a year earlier. From this matching, a C/C (current

current) percentage of the preceding year's number is computed. This percentage is applied to the estimate of chickens on hand December 1 of the preceding year to obtain a current indication of the number of chickens on hand.

The annual inventory estimates of pullets, hens, and other chickens are based on separate C/C ratios for each class. Sample percentages of total chickens in each class are also calculated as an additional indication. These are used in order to be certain that estimates by classes do not deviate from the sample relation between classes.

In addition to estimators computed from sample indications, egg-type chick data obtained from hatcheries and adjusted for imports, exports, and death loss provide reliable indications of inventory size at the national level—especially for pullets not yet of laying age (see figure 17).

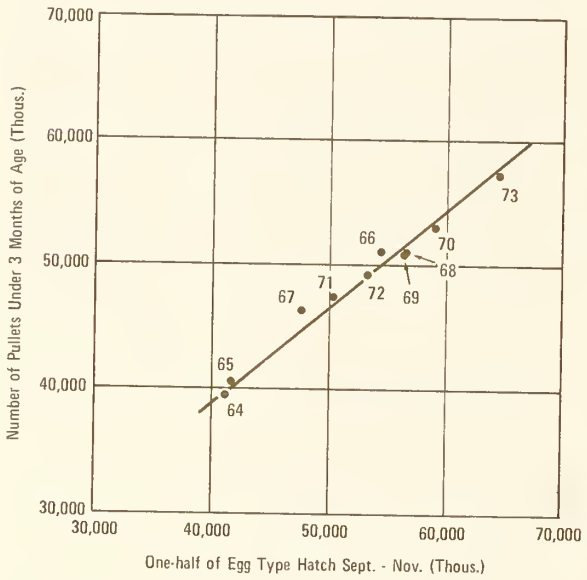


Figure 17.—Example of a chart used in interpreting sample indications in estimating the December 1 inventory of pullets under 3 months of age.

Egg Production

Each month, estimates are made of the number of layers on hand, rate of lay, and total egg production. In estimating the number of layers on hand on the first of each month, two indications are computed from the monthly sample survey: (1) A C/C ratio from the previous month, and (2) a ratio to the December 1 base. The number of layers in flocks on December 1, as shown by the December 1 inventory estimates, becomes the base for estimating numbers of layers by months, because that survey is more comprehensive and statistically more accurate. A subsample of producers in each State is drawn by size-group strata from the December sample and surveyed each month. Current questionnaires are matched with reports received from identical producers a month earlier. From this pairing, a C/C ratio to the preceding month's number is computed. In addition to this matched-sample technique, a ratio-to-base indication is computed. This involves matching current reports with "identical" reports received as of December 1 (the base period). A ratio to the base is derived for each stratum and multiplied by the base total for each stratum. The State base expansion is a summation of the stratum expansions. This ratio-to-base expansion is considered along with the C/C indication. Related hatchery and slaughter data are also considered in making monthly estimates of number of layers.

The estimate of the number of layers on hand during the month is the average of the number on hand on the first of the month and the number on hand on the first of the following month. The indicated daily rate of egg production per layer is the number of eggs produced by respondents' flocks on the first day of each month divided by the number of layers in their flocks on that date, weighted by the number of layers in each stratum. The estimate of the rate for the month is the average of the rate on the first of the month and the rate on the first of the following month. The monthly rate of lay per hen is the average daily rate multiplied by the number of days in the month.

Total monthly production of eggs is computed by multiplying the average number of layers on farms during the month by the monthly rate of lay per hen.

Potential Layers

Estimates of the number of potential layers, which are composed of (1) hens and pullets of laying age and (2) pullets 3 months old or older

but not yet of laying age, are prepared quarterly as of December 1, March 1, June 1, and September 1 by geographic region. For December 1, these estimates are those two components of the December 1 inventory. For other quarters, number of potential layers is estimated by combining the layer component from the monthly estimate of number of layers in flocks with an estimate of number of pullets 3 months old or older but not yet of laying age. For these quarters this estimate is based on hatchery output of egg-type pullet chicks plus placements for broiler breeder flocks adjusted for imports, exports, and death losses.

Forced Molting

Estimates of the percentage of the laying flock that are being force-molted and the percentage that have completed one or more forced molts are prepared monthly for the 17 States where this practice is most prevalent (see table 11). Percentage indications are obtained by computing a weighted ratio of birds reported in each category to the total number of layers (including layers molted and being molted) reported on hand on the first of the month.

Table 11.—States for which estimates of chickens force molted were made—1974

New York	Georgia	Pennsylvania
North Carolina	Ohio	South Carolina
Alabama	Oregon	Tennessee
Arkansas	Indiana	Texas
California	Iowa	Washington
Florida	Mississippi	

Production, Disposition, and Income

Estimates of the production and disposition of chickens, and the income derived are published annually in April. These include estimates by States of the number and live weight of birds produced, consumed in poultry farm households, and sold; cash receipts; gross income; and estimates of death losses.

Total production data are obtained by adding to annual inventory data the increase resulting from hatchings and growth. Since marketing is continuous and is not always in the State in which the birds were raised, estimates of the annual volume of poultry production in each State are developed from December 1 inventories. The latest inventory is subtracted from the preceding inventory to determine the increase or decrease in the number of birds on hand. Next, estimates are prepared for the number of birds produced and sold during the year. The estimate of the number produced is equivalent to the number raised during the year, less death loss of birds that were on hand at the beginning of the year.

The annual death loss of chickens on hand at the beginning of the year is estimated from monthly and quarterly reports from poultry producers showing the number of layers that died during the preceding reporting period. Young chickens from the current year's hatchings that die are not included in the number raised.

The total number of chickens consumed in poultry farm households is obtained from periodic surveys and adjusted for changes in number of chicken farms. An annual estimate of the number of birds consumed is obtained by multiplying an estimate of the annual number eaten per farm household by the number of farms keeping chickens.

The annual number of chickens sold is the number produced, adjusted for inventory changes, less the number consumed in poultry producer households. The State estimates of chickens sold are checked against available data on commercial slaughter of mature chickens. In using data on slaughter of birds, consideration must be given to birds produced in one State and slaughtered in another State.

To obtain estimates of total pounds of chickens produced, it is necessary to determine the total live weight involved in the consumption and sales items. For each series of numbers, a corresponding series of estimated live weights by States is required. The average live weight used in this series is based on slaughter data and surveys of chicken operations.

The average live weight per bird is applied to the increase or decrease in the inventory number to obtain the change in inventory live weight. The number of pounds sold is the product of number of birds sold times the average live weight. Likewise, the number of pounds consumed in poultry producer households is the product of the number of birds consumed times the average live weight.

Production of chickens in pounds during the year is obtained by adding the total pounds sold to the total pounds consumed in the poultry producer households. This total is adjusted by the differences in live weight between the inventory at the beginning of the year and the end-of-year inventory to obtain net total production.

The value of annual production is determined by multiplying the total pounds produced by the annual average price per pound received by producers.

Cash receipts are obtained by multiplying the annual average price per pound by the total pounds sold. Value of chickens consumed in producer households is obtained by multiplying the annual average price by the total pounds consumed in farm households. Gross income is the sum of the cash receipts and the value of home consumption.

CHICKEN HATCHERY PRODUCTION

Data for hatchery estimates are obtained from weekly and monthly surveys of chick hatcheries. The hatchery universe comprises all known hatcheries that hatch egg-type or broiler chicks on a commercial basis. A preponderance of hatcheries specialize in either broiler-type or egg-type chicks, but some produce both types. An attempt is made to get current reports from all hatcheries for the weekly and monthly estimates. At the end of the year an intensive effort is made to obtain reports from those not reporting during the year. Weekly hatchery reports contain estimates of number of eggs set and broiler chicks placed. The monthly reports feature estimates of the number of eggs in incubators and chicks hatched. Estimates of the egg-type hatch provide a continuous record of the potential supply of replacements for the laying flock. Hatchery production of broiler-type chicks provides a measure of future broiler slaughter.

In making weekly estimates, questionnaires are sent to all broiler chick hatcheries in the 21 States that produce over 97 percent of all broilers. Followup telephone and personal interviews are conducted to obtain maximum coverage each week. These hatcheries report by States the number of broiler-type eggs set, broiler-type chicks hatched, and placement of chicks.

The chick placement estimate is the sum of the reported chick placements plus an estimate of the number of chicks produced in hatcheries not reporting. The number of broiler chicks placed in a particular State consists of chicks produced by hatcheries in that State, plus chicks shipped in, minus those shipped out. Estimates of number of eggs set in each State are developed by summing the number reported during the previous week and adding an estimate of the number set in hatcheries not reporting.

In estimating number of chicks hatched monthly, the universe is divided into two groups —(1) hatcheries reporting monthly and (2) hatcheries reporting weekly in conjunction with the weekly broiler program.

Hatcheries which report weekly are not surveyed again at the end of the month. The weekly reports are converted to a monthly basis by adding the full weeks in the month and parts of a week when a week falls in 2 months. In cases where a week falls in 2 months, each day of the week is given equal weight. For example, if 2 days are in 1 month and 5 days in the next month, two-sevenths of the weekly production is added to the first month and five-sevenths is added to the second month.

Reports are obtained from a majority of hatcheries on a regular basis, but, in the absence of a complete enumeration, two indications are derived from the data reported monthly. The matched-report indication compares current hatching reported by hatcheries with the hatch reported by the same hatcheries in the corresponding month a year earlier. This current/current ratio is applied to the estimate of a year earlier (adjusted for changes in the universe) to obtain an indication of the monthly hatch for the current month.

The second indication is based on the relation between the number of chicks hatched during the month and the total capacity of hatcheries reporting. Since the number of chicks hatched per unit of capacity varies with the size of the hatchery, the total operating capacity is established for size groups within each State. Taking each size group as a unit, the ratio of number of chicks hatched to total capacity is calculated for hatcheries reporting. These ratios are applied to the total capacity of all hatcheries in the respective

size group to derive the total number hatched for the group. This procedure assumes that, within a certain size group, hatcheries which did not return the questionnaire operated on approximately the same scale as those hatcheries which did reply. The sum of the size groups is the indicated total production for the State.

Number of eggs in incubators the first of the month is calculated by estimating number of eggs set the preceding 21 days in hatcheries reporting eggs set weekly and adding number of eggs in incubators on the first of the month in hatcheries reporting monthly. A current-to-current ratio is utilized in estimating data for missing hatcheries in the monthly survey.

BROILERS

Commercial broilers are young chickens of the heavy breeds marketed at 2 to 4 pounds live weight, from which no pullets are kept for egg production. Rock Cornish and capons are included.

Broiler Production

The two main reports in the broiler production program are weekly chick placements in the 21 major broiler-producing States and annual broiler production. Data for these reports come primarily from weekly and monthly surveys of chick hatcheries.

Table 12.—States in the weekly broiler placement program—1974

Alabama	Louisiana	Pennsylvania
Arkansas	Maine	South Carolina
California	Maryland	Tennessee
Delaware	Mississippi	Texas
Florida	Missouri	Virginia
Georgia	North Carolina	Washington
Indiana	Oregon	West Virginia

Broiler Chicks Placed Weekly

Weekly estimates of number of broiler chicks placed and of eggs set provide an up-to-date record of developments in broiler production in important commercial areas. This record indicates the volume of future broiler slaughter. The preparation of these estimates is described earlier in this chapter under "Hatchery Production."

These weekly estimates of number of eggs set and of broilers placed are released only in the 21 States in the program. Revised weekly estimates of broilers placed and eggs set in the marketing year December 1 through November 30 are published in the Commercial Broilers report published the following March in Washington, D.C.

Production and Gross Income

The Commercial Broilers report published in March contains estimates of the number of broilers produced, average live weight, total live weight, average price per pound, and gross income for the 21 States in the weekly estimating program.

The number of broilers produced from December 1 to November 30 is estimated primarily from weekly placements during October 1 through September 30, minus estimated death loss. Data from hatcheries reporting monthly or annually are also taken into consideration when making these estimates of broiler production. The growing period for broilers is approximately 8 weeks; therefore, it is necessary to lag placements 8 weeks to arrive at an estimate of broiler production from hatcheries in the weekly program. Mortality is estimated from industry sources.

Average live weight estimates for each State are based on slaughter data derived from Federal and State inspection and from trade sources. Gross income is computed by multiplying the average equivalent live weight price received by the total live weight of broilers produced.

Data for all States on the production of broilers and income derived from their production are published in April in the annual Chickens and Eggs report. In addition to production from the States in the weekly program, estimates are published for States not reporting weekly, if the State's production amounts to one-half million or more broilers a year.

TURKEYS

The turkey statistics program of the Statistical Reporting Service is designed to provide information necessary for timely and accurate analysis of the current situation and future trends in the turkey industry. The statistics are divided into two categories: Heavy breeds and light breeds.

A report indicating the number of breeder hens that flock owners intend to keep for the coming hatching season is issued each September. In January, another report is released that gives the actual number of breeder hens flock owners had on hand December 1. A weekly turkey hatchery report is issued in the nine important turkey-producing States throughout the year. The monthly turkey hatch for all States is shown in the Eggs, Chickens, and Turkeys release. In August, a preliminary report of turkeys raised in the United States during the current year is released. The January report contains the end-of-year estimates of the number of turkeys raised.

Breeder Hens

The 26-State September report covering intentions to produce breeder hens is based on a survey of all breeder-hen flock owners (see table 13). If possible, a complete enumeration is taken. However, when the enumeration is not complete, estimates are made, using the C/C matched-report indication. The same procedure is used to develop December 1 breeder-hen inventory estimates for the January report. The summary of monthly testings of turkey breeder hens for pullorum-typhoid disease is also taken into consideration when making these estimates.

The December 1 breeder-hen estimates are revised, if necessary, the following August. These revisions are based on more complete data from flock owners and testings for pullorum-typhoid by State agencies, which become available after preliminary estimates are prepared.

Table 13.—States making estimates of intentions to hold turkey breeder hens—1974

Arkansas	Minnesota	Pennsylvania
California	Missouri	South Carolina
Colorado	Nebraska	Texas
Georgia	New York	Utah
Illinois	North Carolina	Virginia
Indiana	North Dakota	Washington
Iowa	Ohio	West Virginia
Kansas	Oklahoma	Wisconsin
Michigan	Oregon	

Turkey Hatchery Production

For the weekly turkey hatchery estimates, questionnaires are sent to all hatcheries in the nine major poult-producing States, which report the number hatched and the number of eggs set. Since coverage is nearly complete, the estimates are the sum of the numbers reported, with an allowance for poults produced in hatcheries not reporting. These data are released in State publications by each of the States in the weekly turkey hatchery program.

Table 14.—States in the weekly turkey hatchery program—1974

California	Missouri	Texas
Iowa	North Carolina	Virginia
Minnesota	Ohio	Wisconsin

The hatch of turkey poults in the preceding month and estimates of number of eggs in incubators on the first day of the month for all States are published each month in Eggs, Chickens, and Turkeys. In estimating turkey poults hatched monthly, States in the weekly program base the estimates on weekly surveys. For States not in the weekly program, monthly questionnaires are sent to the hatcheries. Since coverage of hatcheries is nearly complete, the primary indication is based on the sum of the numbers reported, with an allowance for hatcheries not returning a questionnaire. Another indication is used that compares current hatchings reported with the hatch reported by the same hatcheries in the corresponding month a year earlier. This current/current ratio is applied to the estimate of a year earlier to obtain an indication of the hatch of the current month.

At the end of the year all hatcheries not reporting during the year are surveyed by personal visit or telephone calls to obtain maximum coverage. These annual reports, coupled with weekly and monthly reports, are used as a basis for revising the monthly and weekly hatchery estimates of number of poults hatched and of eggs in incubators.

Turkeys Raised

Two reports of number of turkeys raised are issued each calendar year—one in January and the other in August. Turkeys are considered as raised in the year in which they are marketed.

Growers' intentions to raise turkeys during the

coming year in 20 States are published in the January report (see table 15). In August, an early-season estimate of number of turkeys raised in the year is published, which includes estimates for each State and the Nation. The final estimates for all States for the year are published in the January report of the year following, with growers' intentions to raise turkeys in 20 States during the coming year.

Table 15.—States making estimates of intentions to raise turkeys—1974

Arkansas	Missouri	South Carolina
California	North Carolina	South Dakota
Colorado	North Dakota	Texas
Georgia	Ohio	Utah
Indiana	Oklahoma	Virginia
Iowa	Oregon	Wisconsin
Minnesota	Pennsylvania	

Information about growers' intentions is obtained from a December survey of turkey producers. All known producers are surveyed, and the enumeration is as complete as possible.

Estimates included in the August report are based on hatchery data obtained from September through July of the current year, plus an estimate of the number of poults to be hatched during August, which is made on the basis of number of eggs in incubators on August 1. An estimate of death loss is substracted from these data, which then provide the major indications for turkeys raised during the year.

The January estimates of number of turkeys raised are based on the final estimates of poults hatched during September of the previous year through August. The estimates of poults hatched are adjusted for cross-State movement and an allowance for home-hatched poults is added. The number raised is then obtained by deducting death losses, which are based on indications from the December turkey survey.

Turkey Production and Income

A report is published each March that provides estimates of the number of pounds produced, price per pound, and gross income from turkeys. The average live weight used to calculate the pounds produced is estimated from slaughter data and interviews with producers. Total live weight produced is computed by multiplying number of turkeys raised by the estimated average live weight. The average live weight price per pound is estimated from Agricultural Marketing Service (USDA) market news data and information from producers. The average price multiplied by the pounds produced yields gross-income estimates.

The March report also shows by regions the percentage of young turkeys that died during the most recent 3 years, and percentage of breeder hens that died in the Nation during the same period. Data for these estimates are obtained from the December turkey grower survey and industry contacts.

POULTRY SLAUGHTER

Data on number of birds and live weight by classes of all poultry slaughtered under Federal inspection, and poultry inspected for further processing and cut-up, are prepared monthly. Data also include quantities of poultry condemned in both ante mortem and post mortem inspections. The number inspected is shown for young chickens, mature chickens, fryer-roaster turkeys, young turkeys, old turkeys, ducks, and other poultry. All poultry slaughtered in plants engaged in interstate shipments of dressed poultry are required to be inspected by a Federal inspector. These inspectors submit reports to area offices of the Animal and Plant Health Inspection Service, USDA, which in turn forward the data to the Washington office of SRS. These reports are the basis for the data contained in the monthly Poultry Slaughter report.

Poultry slaughtered in plants not under Federal inspection are not included in these data. However, an estimate of total poultry slaughter (ready-to-cook weights) is prepared. This estimate includes slaughter in both U.S.-inspected plants and plants under State inspection, but is not broken down by species. The estimate includes chickens and turkeys but excludes miscellaneous poultry, such as ducks and geese, and is published monthly in Poultry Slaughter. Data on slaughter not subject to Federal inspection are obtained by State Statistical Offices from State poultry inspection agencies. When data by species cannot be obtained from these agencies, SRS surveys all nonfederally inspected poultry plants once a year.

EGG PRODUCTS

Estimates of the number of eggs broken at commercial plants are published for 13 periods of the year by geographic region and for the Nation, beginning on July 1 and ending on June 30. Associated pounds of edible liquid (classified under whole, white, yolk, and total) and inedible liquid (that is not passing inspection) are also shown. The survey periods consist of 4 weeks each, except for the first and last periods, which consist of a varying number of days, depending on where July 1 occurs in the 8 weeks (two 4-week reporting periods) centering on that date.

Estimates for 4-week periods are prepared for all egg-breaking plants in the United States, covering production and disposition of liquid eggs for immediate consumption, for drying and freezing (by class of product), and the total production of dried eggs (by class of product). These data are based on reports of the inspectors of the Poultry Division, Agricultural Marketing Service, USDA and are published 13 times a year in the Egg Products report.

CHICKENS AND TURKEYS TESTED FOR PULLORUM-TYPHOID DISEASE

Information is also compiled on the number of turkeys and chickens blood-tested for pullorum-typhoid disease. These data are tabulations of records from official State testing agencies participating in the National Poultry Improvement Plan under the coordination of the Poultry Improvement Staff of the Agricultural Research Service. These State testing agencies submit reports each month showing the number of birds in breeder flocks tested during the month. These State reports are summarized for the Nation and provide additional information on the number of breeder hens available for supplying hatching eggs. A summary of the number of birds tested is published monthly in the Eggs, Chickens, and Turkeys report.

PULLET CHICKS PLACED IN HATCHERY SUPPLY FLOCKS

The number of pullet chicks available for hatchery supply flocks is another important series of poultry data. This series includes placement data on the number of egg-type and broiler pullet chicks sold for hatchery flock replacement during the month, plus chicks expected from eggs sold during the preceding month by leading primary breeders. This report is an enumeration of all commercially important primary breeders and provides an indication of the potential number of pullets available for addition to hatchery supply flocks several months before the pullets actually move into the flocks. These statistics are published in the monthly Eggs, Chickens, and Turkeys report. ■

Chapter 10

AGRICULTURAL PRICES

INTRODUCTION

The collection of prices by USDA started in 1866 for prices received by farmers and in 1911 for prices paid by farmers. The initial "prices received by farmers" included December 1 prices for 10 crops, and collection of "farm values" as of January 1 for 6 species of livestock began in 1867. The collection of prices as of the first of every month began in 1908 for eight crops, and during the next 2 years for livestock, poultry and their products.

Annual and season average prices derived from these monthly prices received by farmers have replaced the December 1 crop prices and January 1 livestock values as the official series for evaluating production and sales. The January 1 values have continued to be used to evaluate inventory numbers of livestock, except hogs and poultry, which were shifted to December 1 in the late sixties. Beginning in 1924, the monthly prices received were collected as of the middle of the month instead of the first. The series for the earlier years was converted to a midmonth basis.

Commodities have been added, and some dropped, from time to time. A few commodities were added when the monthly prices were started during the 1908-10 period. Several were added from 1919 through 1924, including most of the vegetables and additional fruits. Since the mid-thirties, few new commodities have been added, but several new price series have been added for the old commodities. Most of these involve a breakdown of "all" prices by utilization or class.

The weights used to derive the United States "prices received" from the State prices were shifted from production to sales in 1944. Most regional prices were discontinued in January 1973.

In 1910 the Department of Agriculture started collecting information on prices paid by farmers for some 86 items used in farm production and family living. Thereafter, surveys were conducted annually and later semiannually, quarterly, or monthly, depending on the particular commodity being surveyed. Currently about 550 items are included in these surveys.

PRICES RECEIVED: GENERAL

Definition

The basic concept involved in the official estimates of prices received by farmers is that of a price which, if multiplied by the total quantity of the commodity sold, would give the total amount received by all farmers for that commodity. That is, prices received by farmers are estimated to reflect sales of all classes and grades of the commodity being sold. They reflect discounts for poor quality and premiums for high quality. Estimates relate generally to average prices farmers receive for their products at the point of first sale, usually a local market, or the point to which farmers deliver their products in their own or hired conveyances.

The primary reason for this definition of price is that one of the chief uses of the price data is to evaluate marketings of commodities and thus develop estimates of income to agriculture, which are a part of the national income accounts. Estimates of production of agricultural commodities relate to the commodity defined (wheat, oats, hogs, beef, cattle, etc.) but not differentiated by

market grades and classes, since it is not feasible to make estimates of production or sales on such a refined basis. If the result of multiplying quantity sold by price is to be meaningful in terms of receipts from sale of the commodity, the commodity price must represent the average for all grades of the commodity sold. This then becomes, by definition, the "price received by farmers."

Series of Prices Received

The various series of prices received by farmers include: Season or annual average prices for all commodities for which production is estimated; midmonth or whole month prices for most major commodities; prices by utilization—mainly for dairy, fruit, and vegetables; prices by States for all commodities and by specified areas for a few commodities; equivalent prices by location in the marketing channel for citrus fruit and some poultry; and December 1 or January 1 inventory values for livestock and poultry.

Monthly, Annual, and Seasonal Prices

Midmonth or monthly average prices are estimated each month for about 80 of the more important crop and livestock items. Prices of about 80 additional items are estimated on an annual or season average basis only. These have either relatively short marketing seasons—cherries for example—or they are of relatively minor importance, and season average prices for them are considered adequate. Many crops used for processing are sold mainly on contracts covering the entire season. No price variations of consequence occur during the season and a season average price for these crops is sufficient. States producing minor amounts of some commodities have insignificant sales, and reliable price indications are not available for most months. Only season average prices are estimated for many of these States.

Although "monthly price" estimates for most commodities are defined as relating to the 15th of the month, a more descriptive term would be "midmonth prices," since reports for the 13th through the 17th of each month are used as the basis for most of the estimates. In computing receipts from marketings, these midmonth prices are used to represent the average price received for the commodity during the month.

The price estimates relate to the entire month for apples, peaches, pears, citrus, potatoes, tobacco, wholesale milk, broilers, and wool. For meat animals, milk fat in cream, and some seeds, prices are first estimated on a midmonth basis. However, when check data (such as cost to packer and dairy plant receipts) subsequently become available, midmonth prices for these commodities are revised where necessary to reflect the price of the entire month or season indicated by check data. Prices of commercial vegetables for fresh use are estimated for the first half of the month based on new marketing data. Survey and marketing data subsequently collected for the entire month are used as the basis for monthly average prices. For greater detail see chapter 5.

In States where fruits and vegetables are of major importance, prices are obtained for both fresh consumption and processing. However, except for citrus, monthly prices are estimated only for fresh market sales. Average prices of deciduous fruits sold for processing usually apply to bulk fruit at the door of the processing plant, because almost all deciduous fruit sold directly by the grower for processing changes ownership at this point. Prices are obtained for the major utilizations, such as canning, drying, freezing, and crushing.

Reported "average" prices often do not reflect the actual proportion of sales by the various utilization and method-of-sale categories. For this reason, when price and quantity data by utilization are available, average prices for all sales are derived by weighting the average price for each method of sale or utilization by the estimated amount sold each way.

Equivalent Prices

Another general type of related estimate has been developed to meet specific needs for fruits. When adjustments are made in actual prices to shift to some point of sale other than that at which the sale was made (for example, "f.o.b. shipping point" to "packinghouse door"), the results are called "equivalent per unit returns" to growers. Equivalent per unit returns are usually calculated for two points of sale: (1) Equivalent "packing-

house door" returns refer to all fruit, regardless of method of sale, converted to a price it would have brought if the entire crop, or the portion being priced, had been sold at the packinghouse door; (2) equivalent "on-tree" returns refer to all fruit, similarly converted to the price it would have brought had the entire crop been sold on the tree. Before the marketing season, States converting to "equivalent returns" contact growers, handlers, and shippers to determine the various harvesting and marketing costs used in the conversions. Cost studies from outside agency sources are often used for this purpose.

In the production of some commodities, a sizable share of the inputs come from nonfarm sources and the farmer is paid a fixed fee for his labor, land, or buildings. Prices are not established until further services have been performed after the product leaves the farm. In several States, market prices for broilers are quoted on a ready-to-cook basis. The estimates of prices received are termed "equivalent live weight prices."

Special Livestock and Dairy Prices

Inventory values per head of livestock and poultry on farms are estimated as of December 1 or January 1 of each year, coinciding with the inventory data for each species. They are based on the average value of various weight and sex classes of livestock as indicated from values reported by farmers on the basis of current and past replacement costs of similar animals.

Dairy products are another area in which additional prices have been developed to meet specific needs. These include prices for evaporated whole milk, nonfat dry milk in the Chicago area, dry milk products, milk of manufacturing grade used for butter, cheese, and condensery products and manufacturing-grade milk in Minnesota and Wisconsin. Only the manufacturing-grade milk prices are estimates of prices received by farmers; the others are prices received by manufacturers for dairy products. Detailed discussions of these price series are included in chapter 8.

Estimation of National Prices

The U.S. prices for all commodities are computed by weighting the State prices by sales, both for the monthly and annual prices. The weights for the monthly prices are estimates of quantities sold in each State during the month. These quantities sold change each month, especially for the crops which have seasonal marketing patterns with larger sales at harvest time. Thus the relative weight that a State has in computing the U.S. prices varies from month to month. For commodities with differences in price levels between States, these shifts in weights between States may change the U.S. price more or less than the changes in prices of the individual States. However, the prices for the United States follow the basic concept for prices received by farmers in that they reflect all of the sales made in the Nation during each month.

Prices are not estimated for a State for any month with less than one-half of 1 percent of its sales for the year. For some commodities, primarily those with seasonal sales, all States fall in this category in some months and prices are not estimated for the United States.

Support Prices

In past years the Government has acquired ownership of part of the production of commodities which were under price-support programs. These acquisitions have been made at the support (loan) rate. The season average prices include an allowance for these quantities. The monthly prices are not adjusted to include this allowance.

Income support payments for some commodities have been made on a basis of a uniform rate per unit of volume or weight on all or part of the actual production, or potential production on acreage withheld from production. Prices have been published for cotton, wheat, corn, barley, and sorghum support payments. These prices have been derived by dividing the value of production plus support payments by production. Since these series are weighted by production, they are not entirely comparable with the official price series which are weighted by sales.

Pricing Periods

Annual prices for livestock and products are based on marketings during the previous December through November for poultry and hogs, and during the calendar year for the other livestock

species and products. The season average prices for crops are for sales during their marketing seasons. For any given crop, the marketing season for a State is for a 12-month period beginning in the month in which harvest is started. For corn the marketing season extends from October 1 in the year of harvest through September 30 of the following year in most States. In some Southern States the marketing year is from August 1 through July 31. Thus the season average prices for the United States may reflect sales made in more than a 12-month period. When harvest of a crop in a State extends into two calendar years, the year assigned is the one in which harvest is most active, except for citrus fruits, which are given a 2-year designation covering bloom and harvest.

Revisions

The published prices are subject to revision if additional data become available. Wholesale milk is the only commodity for which the price for the current month is designated as preliminary and subject to change when the "final" is published the following month. Revisions of monthly prices are usually published at scheduled times. These are shown in the index of special features included in the December issue of Agricultural Prices. The revisions of the monthly prices are usually made when the annual or season average prices are published. As a general rule, the monthly prices, including revisions for the entire year, are republished with the annual prices for livestock, poultry, fruit, and vegetables. For most other crops, only the individual monthly prices that are revised are published.

Although annual prices for livestock and poultry are not published until after the end of the marketing year, preliminary season average prices for most crops are published prior to the end of the marketing year. These are based on prices to date with an estimate for the remaining months, except for cotton, for which the forecasting of prices is prohibited by law. At the end of the marketing season, the monthly prices or other indications for the entire year are included in the final season averages. These "final" season average prices are subject to revision when the final estimates for the following crop year are published. Further revision may occur, if necessary, when production estimates are reviewed every 5 years. Very few revisions are made of the "final" prices for the primary items—commodity, class, or utilization. However, revisions in production, sales, or utilization which are used to weight the prices of primary items to derive the "all commodity" or U.S. prices may result in revisions of those prices.

PRICES RECEIVED: DATA SOURCES AND SURVEY METHODS

Difficulty of Price Estimation

Theoretically the universe for prices received by farmers is all sales in which the ownership of farm products is transferred from the farmer to the first buyer in the marketing process. Scientific sampling from this universe is very difficult, not only because of the many outlets through which farmers sell their products, but more importantly because of the changes over the years in the structure of agricultural production.

Nearly 200 agricultural commodities are produced in modern agriculture. Their marketing varies from commodity to commodity and from area to area, and marketing practices are constantly changing. Scarcely a product is marketed today in the same manner as a half century earlier. Collecting valid and meaningful price data, once a relatively simple operation, has become a very complex procedure, and some lagging of this process has resulted from the dynamic shifts in marketing.

In practice, it has been necessary to make compromises. Developing a complete sampling frame of all the buyers that participate in the marketing of farm products would be a tremendous task, one that far exceeds all the resources that have ever been available for this work. For most commodities, certain types of marketing channels are more or less clearly recognizable and account for most of the total marketings, and it has been to these channels that data collection efforts have been primarily directed.

Prices of many farm products have a definite pattern of seasonal fluctuation. Hence, it is necessary to collect price data for most commodities regularly over the calendar year or marketing season; in this way prices can be more accurately reported.

Samples for many commodities are stratified

by crop reporting districts, which have been established as relatively homogeneous geographic areas of the State. These nonprobability samples collected by mail and usually weighted by production, have been considered the most practical way to obtain local market farm price data.

Data Sources

Prices received by farmers for products they sell are collected from various primary sources, but mostly from voluntary price reporters. In general these reporters may be classified in the following broad groups: (1) Independent local buyers—elevators, produce dealers, livestock yards; (2) cooperative marketing organizations; (3) marketing agencies—Federal milk market administrators, State fruit boards; (4) processors, canneries, slaughtering plants; (5) country bankers and merchants; and (6) well-informed farmers.

The number of price reporters varies greatly by States and by commodity. An average of about 4,500 reporters in the U.S. each month supply information used in the preparation of midmonth or monthly price estimates. Many more reporters supply information later for use in the preparation of revised estimates.

Maximum use is also made of data collected by other Government agencies, industry associations, or other sources. These data vary in usefulness, depending on their character and completeness. Records obtained from cooperatives, auctions, or market administrators for some commodities have provided virtually complete price and quantity information concerning a segment of the market. For some types of tobacco, auction sales give a practically complete census of all sales by growers. The records of the Federal or State Milk Market Administration provide complete data on sales of milk eligible for the fluid market in the market area under the control of these agencies. For grain and livestock, market price reports provide indications of price changes within specified quality gradations, but do not account for shifts in relative quantities of different grades marketed. However, the use of the composite estimator and the computer have greatly increased the ability to include consistently both the change and level of market price quotations in the indications of prices received by farmers.

Methods of Data Collection

General questionnaires

Many of the data on prices received are collected with a mailed questionnaire. To some extent this is supplemented by enumerative checks of various types, depending on the commodities in question. Prices of beef cattle are collected by enumeration of actual sales by commission firms and buyers at auctions in a number of States. However, application of expensive probability sampling and personal enumeration methods to collect price data have been limited.

Individual reporters usually have direct knowledge of prices for only a few commodities but often attempt to report prices of items for which they have only limited information, if the items are included on the questionnaire. To minimize biases of this nature, every effort is made, within the limits imposed by available resources, to include on a questionnaire for a given State only commodities produced in that State. Sometimes several States can use a single questionnaire, since a region with a generally similar type of agriculture often covers several States. Sometimes separate questionnaires are used to collect prices for crop and livestock items. For the monthly price inquiries in 1974, 25 different regional questionnaires were used.

The increase of forward contracting of crops at a set price for delivery at harvest or later has added another dimension to collecting and estimating average prices received by farmers. For a given delivery period the contract and open-market prices and quantities may differ significantly. Questions relating to both prices and quantities for contract and open-market deliveries have been added to some price questionnaires. Information on contract sales and price are also obtained for specified commodities from the random samples of growers interviewed in the objective yield surveys.

Special questionnaires

Information collected by a general-purpose questionnaire for a number of commodities is inadequate to estimate prices received by farmers.

Therefore, in many States special questionnaires are directed to buyers of these commodities to obtain price data. Special inquiries are used extensively for vegetables, fruits, nut crops, minor field crops, and field seeds. The use of such questionnaires sent to buyers of agricultural commodities has increased in recent years, and further increases are expected.

Price data alone are inadequate for estimating prices for several commodities. Special questionnaires are usually used for these commodities. Milk data are collected on pounds purchased and total dollars paid. Information on quantities purchased and price is collected for processed fruits and vegetables, and for other commodities, such as cotton and potatoes. Price data are sometimes reported by grades or other breakdowns for some commodities, such as milk and eggs. Combining the reported data on quantities, grades, and utilizations with prices or values gives a better indication of the "all" price for a commodity than would be obtained from a single question for which the respondent is expected to report a price that reflects these combinations.

USDA's Agricultural Marketing Service needs a two-State (Minnesota-Wisconsin) average price and fat test for manufacturing-grade milk by the 5th of the following month, for use in establishing prices of specified classes of milk in most Federal milk order markets. Minnesota and Wisconsin together account for about 53 percent of the U.S. production of manufacturing-grade milk. To fill this need, data are obtained from special questionnaires received from a probability sample of plants manufacturing cheese, butter, nonfat dry milk, and condensed milk in the two States. (See chapter 8 for further details.)

Mailing lists of price reporters are reviewed from time to time in an attempt to obtain geographic coverage as balanced as practicable. Returns from well-maintained lists of price reporters, from which nonresidents are systematically dropped, vary from about 25 percent to about 60 percent. New names are added to replace dropouts by (1) use of classified telephone directories from small towns to identify buyers of farm commodities by type of business; (2) obtaining lists, classified by type of business, from State tax or licensing authorities; (3) compiling names of advertisers, by type of business, from county newspapers serving rural areas; and (4) use of names of buyers provided by farmers on other survey lists.

Enumerative Methods

Personal enumeration in some States has improved the accuracy of beef cattle price estimates. In these States, enumerators transcribe records of sales by farmers through commission firms, auction rings, packing plants, and other cattle-marketing agencies. Enumerative survey methods are also used for pricing certain short-season crops grown within concentrated areas, and for some other commodities for which relatively few firms, cooperatives, or individuals handle the bulk of the output.

PRICES RECEIVED: SUMMARIZATION AND ESTIMATION

Questionnaires are mailed each month from State Statistical Offices (SSO's) in time to reach respondents about the 13th and are returned to the SSO's shortly thereafter. Responses dated before or after the 5 business days centering on the 15th are not used, thus maintaining the mid-month character of the price data. Questionnaires returned to SSO's are edited and summarized by crop reporting districts, and combined with supplemental check data to arrive at a composite price estimate for each commodity. The weights for combining survey and check data indications are generally based on historical relationships that take into account how well the indicators have performed in the past. The State Statistician makes his recommendation for each commodity, departing from the composite estimate only if there is conclusive evidence of survey or check data bias or incompleteness. In such cases, the statistician explains the change in his comments submitted to Washington, D.C.

The composite estimating procedure is a consistent method of combining all indications important in determining an average price for the commodity. It is also an unbiased estimate if the component indications are unbiased and the weights used for combining indications are set in advance. An example of the composite estimating procedure for corn is shown in table 16.

Monthly recommended estimates for most field

crop and livestock commodities, along with the composite estimate and its components, are transmitted to Washington, D.C., by airmail and telecommunications. The data are in "machine readable" form for quick summarization into national averages.

The first computer processing step is to edit the data for errors in the computation of the composite estimate and omissions in recommendations. Once these errors have been corrected, worksheets are generated that show all State prices and a U.S. weighted average price. The U.S. weighted average price is computed by weighting State recommendations by historical sales weights. For crops, the sales weights are usually averages of the past 3 years, but for livestock the latest marketing year's weights are used.

Washington, D.C., price statisticians review worksheets and evaluate each State's price recommendations. A State recommendation may be rejected on the basis of additional data available at the national level, but not available at the State level. After all prices for a commodity have been reviewed, the U.S. average price is recomputed. Once prices for all commodities are reviewed and final U.S. averages computed, the U.S. prices are available for the computation of the "index of prices received." The index values, together with the appropriate State and national price estimates, are included in the published report. The States utilize the data for computing State indexes and issuing State reports called for by their publication programs. Records of State and national price estimates are kept in both Washington and the respective State Statistical Offices.

Season average prices of all commodities are estimated at the end of the crop season or livestock marketing year. These prices are based on monthly estimates already set, sales data, and any new check data. For those commodities which are under a Government loan program, data from the Commodity Credit Corporation is utilized in estimating season average prices.

An example of season average price computations for rye is shown in table 17. The estimates of season average prices are used to compute value of production and, in turn, gross farm income, which is a component of gross national product accounts.

PRICES RECEIVED: INDEXES

The Index of Prices Received by Farmers, published each month in Agricultural Prices, provides a composite measure of the average change in prices of agricultural products from month to month and year to year at the point of sale by

Table 16.—Corn: Composite State price estimate, June 15, 1974

	Survey data		Composite estimate component	
	No. of reports	Average reported price	Price	Weight
Straight average	110	$2.664	$2.664	5
Weighted average	110	2.660	2.660	60
Identical	82	—	2.671*	10
	Check data			
	Market price	Adjustment factor**		
Chicago #3 yellow	2.873	.92	2.643	5
Illinois Mkt. wtd. average	2.683	1.00	2.683	15
Chicago #2 yellow	2.92	.93	2.716	5
Composite			2.667	100
Recommended price			2.67	

* Reported percentage change times May 15 Board price.

** A factor used to adjust check data prices to a level which reflects prices received by farmers under current SRS definitions. For corn this is an adjustment for transportation charges from local elevators to the Chicago market.

the farmer. Index numbers are also computed for two main groups—crops, and livestock and livestock products. The all-crops index is calculated by combining the following eight subgroup indexes: Food grains; feed grains and hay; cotton; tobacco; oil-bearing crops; fruit; commercial vegetables; and potatoes, sweetpotatoes, and dry edible beans. In addition, feed grains, fresh market fruit and fresh market vegetable indexes are calculated as subgroups of their respective indexes. The livestock-and-products index is calculated by combining the following four subgroup indexes: Meat animals; dairy products; poultry and eggs; and wool. The Index of Prices Received by Farmers, that is, the all-farm-products index, is computed by combining the group indexes for all crops and for livestock and livestock products. Seasonally adjusted indexes are computed and published for fresh market fruit, fresh market vegetables, potatoes, dairy products, and poultry and eggs.

The indexes currently use the years 1953-57 for the weight base period. Weights derived from this period have been used in computing index values beginning with September 1952. The indexes are compiled from prices of 55 commodities which represent about 93 percent of the total value of agricultural marketings during 1953-57. Of the 7 percent of total value of marketings not represented by the 55 commodities in the indexes, nearly 3 percent is accounted for by forest, nursery and greenhouse products, about 1.5 per-

Table 17.—Rye: Season average State prices, 1971 crop

Month	State A			State B		
	Percentage sold		Average price per bushel	Percentage sold		Average price per bushel
	Open market	All sales		Open market	All sales	
	Percent	Percent	Dollars	Percent	Percent	Dollars
May	1		1.03			
June	50		1.05			
July	28		1.07	29		0.77
August	8		1.10	42		.68
September	7		1.05	4		.72
October	2		1.03	2		.73
November	1		1.06	1		.71
December	1		1.07	2		.74
January	1		1.05	4		.78
February	1		1.05	3		.78
March				4		.81
April				2		.81
May				4		.80
June				3		.77
Open market	100	100	1.06	100	35	.73
	1,000 bu.			1,000 bu.		
Outstanding Commodity Credit Corporation loans	2	0	.87	7,569	65	.85
Total sales	577	100	1.06	11,581	100	.81

cent by fruit and nut crops, about one-half of 1 percent by sugarbeets, and the remainder by other commodities. The value of these commodities is represented in the index by imputing it to subgroups and groups whose price movements are presumed to be reasonably similar.

The indexes are basically of the Laspeyres aggregative type which has the following general formula:

$$I = \frac{\Sigma P_{i_1} W_{i_0}}{\Sigma P_{i_0} W_{i_0}} (100)$$

where

I = Index for a particular group or subgroup;

P_{i_1} = current price for i^{th} commodity;

P_{i_0} = base period price for i^{th} commodity;

W_{i_0} = base period weight for i^{th} commodity

The indexes are modified from the above formula to: (1) Permit reflecting changes over time in the relative importance of commodities by chaining together several "links," each link consisting of an index computed by using as a base period the period from which the weights were derived; (2) introduce (or drop) commodities for which satisfactory data were not available over the entire period covered by the index, or the relative importance of which was too small to include in the entire period; and (3) assign to appropriate commodity groups and subgroups the weights for commodities not specifically included in the index.

In calculating the monthly indexes currently, the average quantity marketed of each commodity for the 1953-57 base period is multiplied by the current price received by farmers to obtain a value for the commodity. Values of commodities making up a subgroup index are summed to a subgroup "aggregate." The subgroup aggregate is divided by its 5-year average aggregate for 1953-57 (the base aggregate) to obtain the subgroup index for the month, based on 1953-57 = 100. These subgroup indexes are combined into the group index for all crops and the group index for livestock and products, using percentage weights derived from the average value of marketing during the period 1953-57 for each subgroup. A similar procedure is used to combine the all-crops index and the livestock-and-products index into the all-farm-products index.

After the subgroup, group, and all-farm-products indexes for the current month are computed on the basis of 1953-57 = 100, they are converted and published on a January 1910-December 1914 = 100 basis and a 1967 = 100 basis. The January 1910-December 1914 period has been specified by law as the base period for computing parity prices of many comodities, whereas the 1967 period corresponds to the base period used currently for most Government indexes. The indexes on the 1910-14 = 100 basis are constructed by using 1924-29 average marketing weights for the months January 1910 through January 1935, 1937-41 weights from January 1935 through September 1952, and 1953-57 weights from September 1952 to the present. The indexes on a 1967 = 100 basis are constructed by using average marketing weights for 1953-57.

General revisions in the indexes are made from time to time (the precise timing depends on administrative determination and other factors) to update weights or to revise earlier weights if necessary and to add or drop commodities from the index where sufficient changes in relative importance occur. Each May, revisions are made in the monthly indexes for the current year to date and for the 3 preceding calendar years to reflect revisions in the component price series. Additional price information becomes available for about four-fifths of the 55 commodities in the index subsequent to first publication of an estimate; for about one-tenth of the commodities—mainly fruits, vegetables, and milk—final information is not available until about 2 years after the first monthly estimate. About two-thirds of the total number of revisions each year are due to revisions in fruit and vegetable prices.

PARITY PRICES

Definition

Parity prices for farm products were first defined by the Agricultural Adjustment Act of 1933. Agricultural leaders had recognized that high or

low prices for farm products are not in themselves of primary significance. They realized that of far greater importance is what farm products will buy in terms of food, clothing, feed, machinery, fertilizer, and other things that farmers need for living and for production.

In giving this idea legislative definition, the Agricultural Adjustment Act of 1933 declared it to be the policy of Congress to "reestablish prices to farmers at a level that will give agricultural commodities a purchasing power, with respect to articles that farmers buy, equivalent to the purchasing power of agricultural commodities in the base period." Parity prices have come to be the most commonly used parity standard; they are the prices that will give a unit of a farm commodity the same purchasing power, or exchange value in terms of goods and services bought by farmers, that farm commodities had in a selected base period (1910-14), during which these price relationships were considered to have been reasonably well balanced. In short, parity prices are a yardstick for measuring how close prices received by farmers are to the price Congress defined as a fair goal or objective.

The parity price formula does not measure cost of production, standard of living, or income parity. It is not a comprehensive measure of the economic well-being of farmers. It is based on price relationships which are only one component of cost of production and income.

Inasmuch as the base period for comparison specified by law is 1910-14, the ratio-to-parity comparisons do not take into account the many technological developments that have occurred over the last several decades affecting the efficiency of input utilization in the production of many crops and livestock products.

Parity prices are computed in terms of prices received by farmers in the local markets in which they ordinarily sell. Prices received generally relate to the average of all classes and grades of a commodity sold by farmers; the same is true of parity prices. Parity is a concept of national application; parity prices are not computed by States or for specific markets. However, in connection with some of the price programs, differentials are determined for grade, location, or season. Differentials may be applied to the national average parity price to determine the "parity equivalent" for a specific grade or location. They are applied more often to the national average price-support level to determine the support price for specific grades, locations, or seasons.

Base prices used in calculating parity prices are averages of prices received by farmers during the last 10 years; therefore, any seasonal element is largely averaged out. Parity prices, therefore, do not need to be adjusted for seasonal variation. Prices received by farmers for eggs and milk at wholesale (commodities that have a strong or regular seasonal movement) are adjusted for seasonal variation before they are compared with the corresponding parity prices.

Legislative Refinements

Three principal refinements in the legislative definition of parity have been made since 1933. They are:

(1) To include interest on mortgage debt secured by farm real estate, taxes on farm real estate, and, since January 1950, wages paid hired farm labor in the Index of Prices Paid by Farmers used in computing parity prices; (2) to reflect in the base-period prices for individual commodities, price relations during the most recent 10-year period, but to retain 1910-14 as the reference point for expressing equality between prices received for farm products and prices paid by farmers; (3) a third refinement has been introduced since the Emergency Price Control Act of 1942 specified that wartime subsidy payments should be included in the "prices received by farmers" used in parity computations. Allowances for unredeemed loans and other supplemental payments authorized by the Congress in the administration of price-support operations are similar to wartime subsidy payments in their relation to prices received by farmers. It was thus administratively determined that those allowances and payments would be included in making parity price computations.

SRS publishes periodically in Agricultural Prices parity prices for approximately 145 agricultural commodities. Monthly publication of parity prices for the more important commodities was begun in September 1933, but calculations of parity prices for many of the minor commodities were not made until June 1942. Since January 1965,

only parity prices for principal commodities, and those parity prices which are needed for the price-support or marketing-order programs, are published each month. The complete list is published in January and July. For each major commodity, the current U.S. average price received by farmers is divided by its respective parity price to obtain a "percentage of parity" which is also published each month. The parity prices compiled on the basis of data for any month are the legally applicable parity prices for the following month. For example, parity prices computed from prices for January 1974 were the legally applicable parity prices for February 1974.

Since September 1950, the policy followed by SRS is that a parity price for a commodity once published is not subsequently revised. Thus the parity price published in any month continues to be the official parity price for the following calendar month, and administrative actions based thereon remain in effect even though the index numbers of the basic price series used in its computation subsequently may be revised.

Although parity prices are only a measuring device, they have played an important part in agricultural policy since the 1930's. When action programs based on parity prices are in operation, prices received by farmers may be appreciably affected.

Uses of Parity Prices

Following are some of the more significant uses of parity prices:

(1) To provide a basis for measuring changes in the purchasing power of a unit of a commodity. A comparison of the parity price with the price actually received by farmers for a commodity gives a measure of the change in the per unit purchasing power for that commodity.

(2) To determine support-price levels. Historically, legislation requiring or authorizing the United States Department of Agriculture to support prices of agricultural commodities has not specified the dollars-and-cents prices at which the commodities were to be supported. Instead, legislation indicated a specific percentage of parity, or a range in percentage of parity, at which the commodity must or may be supported. The U.S. support levels usually have been announced both in percentages of parity price and in dollars and cents. Since 1974, parity prices no longer determine support prices for such commodities as the food and feed grains, and upland cotton. Price support for those commodities will be based on "target prices" specified in the law.

(3) For marketing-agreement and marketing-order programs. Parity prices are used in the administration of marketing-agreement and marketing-order programs of the Department for milk, fruits, vegetables, and certain other agricultural commodities, including nuts, tobacco, and hops, as provided in the Agricultural Marketing Agreement Act of 1937, as amended. Under such programs, the handling of an applicable commodity is subject to regulation; the statute authorizes no action which has for its purpose the maintenance of prices to farmers above the parity level.

Calculation of Parity Prices

Under the provisions of the original Act of 1933, parity prices were calculated by multiplying the average price received for a commodity during the base period by the appropriate index of prices paid by farmers. The base period was August 1909 to July 1914 for all commodities except tobacco. For example, the average price of corn for the 60 months August 1909 through July 1914 was 64.2 cents per bushel. The Index of Prices Paid by Farmers for September 1933 was 116 (1910-14 = 100). Multiplying 64.2 by 1.16 (116 percent) gives the September 1933 parity price of 74.5 cents per bushel for corn.

Changes in Parity Price Formula

Only minor changes were made in the calculations until 1950. Interest and taxes on farm real estate were added in 1935 to the "price paid" index for commodities using the 1909-14 base period for prices received. Additional exceptions were made to the 1909-14 base, primarily for commodities for which satisfactory data were not available for August 1909-July 1914. All or part of the period of August 1919 to July 1929 was used as the base for most of these commodities.

The first major change in the parity price formula became effective January 1, 1950. Under its modernized or new formula, Congress sought to maintain the overall 1910-14 balance between prices received and prices paid by farmers, but

at the same time to have the parity prices reflect the current relationship among prices of individual farm commodities.

Briefly, the chief differences between the new and the old formulas are as follows:

(1) The adjusted base-period price under the new formula takes into consideration price relationships among commodities in the most recent 10-year period, whereas the old formula retained the relationship that existed in the original base period.

(2) The 10-year average in item 1 above is adjusted to a 1910-14 level, using the average of the index of prices received for all commodities for the same 10 years.

(3) An allowance for wages paid farm labor is included in the Parity Index (Index of Prices Paid by Farmers for Commodities and Services, Including Interest, Taxes & Farm Wages, based on 1910-14 = 100).

Method of Computation

The actual method of computation under the current formula is as follows:

(1) The average of prices received by farmers for individual commodities for the 10 preceding years is calculated (for 1974, the period is 1964-73). An allowance for unredeemed loans and for other supplemental payments resulting from price-support operations is included for those commodities for which applicable.

(2) This 10-year average is divided by the average of the Index of Prices Received by Farmers for the same preceding calendar years, adjusted to include an allowance for unredeemed loans and other supplemental price-support operations, to give an adjusted base price.

(3) Parity prices are computed by multiplying the adjusted base prices by the current Parity Index (with 1910-14 = 100).

For the purpose of illustrating the computation of parity prices, the calculation of the parity price for corn based on data for January 1974 is as follows:

The 120-month, January 1964-December 1973 average of prices received by farmers for corn was $1.36 per bushel, adjusted to allow for unredeemed loans and other supplemental payments resulting from price-support operations. The 120-month average of the Index of Prices Received by Farmers, adjusted to include an allowance for the same factors, was 299 percent. Dividing $1.36 by 2.99 (299 percent) gives $0.455 per bushel, the adjusted base price. Multiplying this adjusted base price by 5.38 (538 percent), the Parity Index based on data for January 1974, equals $2.45 per bushel, the parity price of corn during February 1974.

The period used for computing the "adjusted base period" moves forward a year at a time. This was designed to keep the relations between commodities more nearly in alignment with current conditions. It also made possible the calculation of parity prices for new commodities which have become increasingly important since the base periods prescribed by early legislation before and after World War I.

Adjusted base prices are recalculated in January of each year. The law provides that the marketing seasons beginning in the preceding 10 calendar years shall be used in determining the adjusted base price for those commodities whose parity prices are based on weighted season average prices. For these commodities, the adjusted base price is subject to revision during the year as revised season average prices become available. Any such revision of an adjusted base price is usually made no later than July of each year. For the remaining commodities whose parities are based on an average of monthly prices in the preceding 10 calendar years, any revision required in the adjusted base is similarly made no later than July of each year.

Owing to the differences in level of parity prices calculated by the old and new formulas, "transitional" parity prices were used to spread out the shift. The transitional parity price was the parity price computed under the old formula less 5 percent per year. The shifts started with 1950 for the nonbasic commodities, but not until 1956 for the basic commodities. The last commodity went completely over to the new formula in January 1965.

PRICES PAID: DESCRIPTION

The series of prices paid by farmers is the counterpart of the series of prices received by farmers. Accordingly, estimates of prices paid by farmers relate to average prices paid by farmers for a wide variety of items used in the operation of farms and for their family living expenses.

Prices are obtained from the sellers and are considered as being at the seller's location unless otherwise specified. Since prices received by farmers reflect sales of all classes and grades of the agricultural commodity being sold, a comparable concept is used in connection with prices paid. Prices paid should reflect the average price of items farmers actually buy under the economic conditions at the time of purchase.

Ideally, to maintain conceptual similarity to prices received, the price paid for a given item should be the average price which results from dividing the total amount farmers spent for the item in a given period by the number of items bought. Thus the average price, when multiplied by quantity bought, would equal total expenditure for the item. However, it is not feasible to obtain the data needed for such a computation. In pricing most items, emphasis is placed on the kind "most commonly bought by farmers," or the "volume seller," as representing the closest approximation to the concept used for estimation of prices received by farmers.

Items on the mail questionnaires sent to sellers are described in the simplest way consistent with definite identification. Instructions request that the merchant report the price in effect on the 15th of the month for the "kinds most commonly sold to farmers." With such descriptions as "round steak, per pound; coffee, per pound; men's work shoes, per pair," there is obviously some range of variation in both product and price. The kind most commonly sold in one community will not necessarily be the volume seller in another, and the volume seller in one month may not be the volume seller in the next. But the average of prices compiled from all reports will closely approximate the average prices paid for items bought by farmers during a given pricing period.

It is believed that pricing on the basis of the most popular items, within a reasonably delineated commodity description, tends to reflect accurately the changes in real prices paid by farmers to obtain the satisfaction of their wants. This principle seems applicable whether the commodity priced be clothing, shelter, food, or automobiles.

In pricing goods and services, emphasis has been placed on maintaining comparability in terms of economic use and function, rather than on purely mechanical terms which are frequently of a transitory character and shift with technology and fashion.

PRICES PAID: DATA SOURCES AND COLLECTION

The universe of inquiry for prices paid by farmers is conceptually the totality of all purchase transactions by farmers to acquire the goods and services used for family living and farm production. It is readily apparent that a completely scientific sampling from this universe would be very complicated. The preparation of a complete sample frame of all retailers and other dealers who sell to farmers is a task transcending the resources available for this work.

As a practical expedient, information on prices paid is collected from samples consisting mainly of independent and chain stores that handle items purchased by farmers. Farmers comprise the data source for certain commodities or services, such as feeder pigs purchased and cost of electric or telephone service. Prices as reported by USDA's Market News Service are used for feeder livestock, and trade publications are used for some items, such as newspaper and magazine subscription rates.

Independent-store surveys are organized in terms of commodity groups. Feed dealers and hatcheries are surveyed monthly. Foodstores, clothing stores, household-furnishings and appliance stores, hardware and farm-supply stores, service stations and auto-supply stores, dealers in building and fencing material, fuel dealers, marketing-container suppliers, and dealers in farm implements and machinery are surveyed quarterly. Fertilizer dealers, seed dealers, and dealers in new and used cars and trucks are surveyed semiannually. Price indications provided by these surveys are used for computation of the commodity subgroup indexes published quarterly.

Quarterly estimates of prices paid by farmers for feeder pigs in 27 States are obtained from farmers on the general inquiry that is sent to crop reporters about the first of February, May, August, and November. Interquarterly price estimates of feeder pigs are based on reports of sales at feeder pig auctions and on market news reports. Market news reports provide monthly information on prices of feeder cattle and calves and of sheep and lambs at leading terminal markets. Informa-

tion concerning wages is obtained from the quarterly farm labor and wage surveys. Index information on taxes on farm real estate and interest on farm real estate mortgages is obtained annually from the Economic Research Service for inclusion in the Parity Index.

Data are collected monthly from chainstores by mail questionnaires supplemented by a limited number of personal interviews by State Statistical Office personnel in 17 States. Chainstores handling food, clothing, household furnishings, building and fencing materials, hardware and farm supplies, and auto supplies are surveyed from Washington, D.C. The data from chainstores provide a basis for the monthly estimates until the results of the next quarterly independent-store survey become available. Semiannual surveys of retail seed dealers are also conducted from Washington, D.C. An annual farm survey obtains information on costs of telephone service, electricity, and liquified petroleum gas.

The questionnaires used in some commodity surveys are regionalized to accommodate the varying purchasing patterns in different parts of the country. Questionnaires are also "seasonalized" to allow for inclusion of seasonal items and to keep the questionnaires from becoming unduly long.

The inquiries are mailed to reach respondents about the 13th of the month. Replies dated or postmarked from the 13th to the 17th of the month are used in the summarization.

Sampling is largely on a geographical basis within States to provide representation for all kinds of stores throughout the State, with consideration given to intensity of agriculture and density of farm population.

State Statistical Offices supplement mail surveys with interviews of a limited number of stores or dealers. The personal interview provides up-to-date information on trade practices, pricing, and discounting. This is especially important in the case of auto and farm machinery dealers, since mail reports generally do not fully reflect discounts which may be offered.

An annual telephone, electric, and LPG (liquified petroleum gas) survey is made to obtain cost data needed for the prices paid index in both the family living and production indexes.

Respondents are asked if they have a telephone, the type of service, and for a breakdown of costs as shown on the last bill received. For electricity, the last bill is used to obtain total expense and the kilowatthours (kWh) used, with a separate section for electricity used for irrigation and drainage. LPG questions relate to the uses, method of purchase, and the cost and quantity of last purchase.

Survey data are used to estimate the number of farms using the item, and costs per unit (i.e., monthly phone expense, cost per kWh of electricity, and cost per gallon or pound of LPG). The survey does not provide an estimate of annual usage or consumption.

Survey results are published in the Agricultural Prices report.

Since response to mail surveys is entirely voluntary, maintaining an adequate list of reporters is a continual program. Mailing lists are reviewed from time to time and the nonrespondents are dropped from the lists. New names are added from local advertising media, such as telephone directories and newspapers, from State sales tax registration lists, and from commercial publications which list retail outlets.

PRICES PAID: SUMMARIZATION AND ESTIMATION

Summarization procedures include review and editing of questionnaires for reasonableness and obvious errors and computing simple averages and weighted averages where valid weights are available. Such weights are usually confined to production items, since weights for items used in family living are not available for geographic units smaller than States.

Analysis of price indications includes use of frequency distributions of reported prices, the observation of price changes by firms reporting in both current and previous months, and in some cases independent check data, such as local market prices reported by other agencies or organizations.

The various price indications are reviewed, and recommended estimates are set by the State Statistician. If the Statistician departs from the survey indications in making a recommendation, he provides a written explanation which accompanies the survey report submitted to Washington, D.C.

In Washington, D.C., State estimates are

adopted for each commodity. Weighting of State data to compute regional and U.S. average prices is based on sales data, if available, or on average purchases per farm as determined by special surveys of farm expenditures and numbers of farms. The U.S. averages are used in the computation of the subgroup and group indexes of prices paid needed for computation of the overall prices paid index.

In the months that only chainstores are surveyed, neither the individual commodity prices nor the subgroup indexes derived from them are published, because of the small samples. The commodity prices indexes are used only for the derivation of the production and family living indexes, which are published each month.

PRICES PAID: INDEXES

Although prices enable comparisons of purchasing power, such as the number of bushels of wheat required to buy a tractor, they do not provide a broad comparison of purchasing power of farm products as a group. In 1928, the USDA first published an Index of Prices Paid by Farmers. The index was developed to meet the need for a better general measure of changes in prices of goods and services bought by farmers. The index has become a symbol for the appraisal of farm well-being as a result of its wide use in determining whether prices of farm products keep in step with the prices of commodities bought by farmers. The components of the index provide only a measure of changes in prices or cost, and do not provide an index of changes in farm production and living expenditures.

In the development of the prices paid indexes, a major problem was the choice of a base period with fairly stable prices. Prices had not been stable enough following World War I to provide a satisfactory base. An analysis of dispersion of wholesale prices from 1891 to 1926, inclusive, indicated that the period of least dispersion was 1905-15. The decision was made to use 1910-14 as the base period for the index and this was specified in the Agricultural Adjustment Act of 1933 as the base period for computing parity prices for many commodities farmers sell. The indexes are also published on a base period of 1967 = 100, which is used currently for most Government indexes.

There are five major components in the Index of Prices Paid by Farmers for Commodities and Services, Including Interest, Taxes, and Farm Wages. In terms of farm expenditures, the two most important components are the index of prices paid for commodities used in farm production and the index of prices paid for commodities used in family living. These two indexes comprise the "Index of Prices Paid by Farmers for Goods and Services." The remaining three components of the index are: (1) Interest charges per acre on mortgage indebtedness secured by farm real estate; (2) taxes payable per acre on farm real estate; and (3) wages paid to hired farm labor.

The two major components of the index are stratified further into 15 subgroups. The farm production index is divided into nine subindexes —feed, feeder livestock, motor supplies, motor vehicles, farm machinery, farm supplies, building and fencing materials, fertilizer, and seed. The family living index is divided into six subindexes —food and tobacco, clothing, household operations, household furnishings, building materials, and automobiles and automobile supplies. Each subindex represents an important class of farm expenditures and provides the basis for comparing price changes for the various groups of commodities and services that farmers buy.

The overall index is called the Index of Prices Paid by Farmers for Commodities and Services, Including Interest, Taxes and Farm Wages. It is commonly known as the Parity Index when expressed on the 1910-14 base. The subindexes are published monthly for the overall index and the five major components plus feed and feeder livestock. The other subindexes are published in March, June, September, and December. The prices are reported and indexes published for seeds in April and September, for fertilizer in April and October, and for motor vehicles in May and November. The prices paid for production items, interest, taxes, and wages are combined into an index that is published monthly.

On June 15, 1974, the farm production component of the index included 240 different commodity price series; the family living component, 242 items—for a total of 482. Prices for 42 items are used in both the family living and production indexes, leaving a net of 440 separate price series, in addition to interest, taxes, and farm wages, in

the index. The last revisions were made in January 1959 when the data for the 1955 survey of farmers' expenditures were incorporated into the weights. Farm production expenditure data collected in 1972 and family living expenditure data collected in 1973 and 1974 will provide data needed to reweight and update the content of the "prices paid indexes."

The average expenditures per farm as obtained from the expenditure surveys provide nearly all the data used to derive revised percentage weights to be used in combining commodity indexes into group indexes and derive quantity weights of items selected for commodity indexes. The first step in index revision is to allocate each expenditure to either the farm production or family living index; then the items are further divided into commodity index groups, such as feed, motor supplies, and building materials. The percentage of total farm expenditures corresponding to each index group becomes the percentage weight assigned to that commodity index group.

The items representing the largest expenditures are selected for pricing within each commodity index group. Items not selected for pricing are associated with similar items selected for pricing; the average expenditures are then added to that of the selected items to derive quantity weights (see formula below).

Derivation of quantity weights for prices paid indexes:

$$\text{Quantity weight assigned to index item selected for pricing.} = \frac{\text{Average expenditure per farm for index item selected for pricing.} + \text{Sum of average expenditures for similar items not selected for pricing.}}{\text{Average price of index for base weight period.}}$$

Not all items can be associated with an item selected for pricing and not all items fit into an existing index category. In this case the expenditures are imputed into either the group index or the overall production or family living index to properly distribute the expenditures. Examples of such expenditures are marketing expenses; equipment repairs; custom work; insurance; and medical, dental, and hospital expenses. These items must be considered in the overall weight even though no specific price series are available for their measurement.

Product specifications must be prepared for each item priced. The expenditure surveys contain questions about size, make, model, etc., to aid in specification preparation. This information is supplemented with Government reports on production, and trade reports and publications on production and retailing of goods and services.

Prices, as well as the average per farm expenditure for a given item, fluctuate among States; hence, survey price recommendations are weighted by States to obtain the U.S. prices used for index computations. These weights are reviewed and updated during the index revision process. Retail sales are the most logical bases for establishment of State weights, but are available for only a few production items. Many of the items priced are used by both rural and urban residents; therefore, weights must be based on secondary data, such as the number of farms, production expenses, public and private studies of retail sales, and consumption patterns.

Indexes are computed, using the new base weights and the updated items for a few years prior to the base year. These indexes are then compared with the old base indexes to find the month where the indexes match as closely as possible. At this point the indexes are linked to provide a continuous index series.

EXPENDITURE SURVEYS

Expenditure survey data serve three major purposes: (1) To provide weights reflecting expenditure patterns for use in calculating price indexes, (2) to establish benchmark data for estimating farm production expenses, and (3) to provide estimates for many farm expenditures not available from the agricultural censuses or other surveys.

Survey of Farmers' Expenditures During 1955

The first comprehensive surveys of farm production expenditures and farm family living expenditure patterns were conducted during February and March 1956 with information obtained for expenditures during 1955. Respondents were

asked detailed questions about commodities and services purchased in 1955. One questionnaire covered production expenses and another living expenses. A different sample was used for each.

The survey of farm production expenses was designed to estimate the money expenditures made or incurred in the operation of farms by all farm operators and their landlords in the United States during the calendar year 1955. Also included were selected production expenditures by farm operators while engaged in custom farmwork for others. The survey of family living expenses was designed to obtain the money expenditures made or incurred in 1955 for family living by farm operators and members of their "economic" families.

The 1954 Census of Agriculture was used as a basis for sampling. The sampling rate for production expenses was varied by economic class of farms to increase the statistical efficiency. The family living sample was drawn in proportion to the total number of farms, since family living expenses tend to remain fairly constant regardless of economic class of farm.

The data were collected by enumerators in 306 primary sampling units (counties or pseudocounties) throughout the United States. The number of usable questionnaires totaled 6,715 for production expenditures, and 3,845 for family living expenditures.

The 1955 expenditure survey data were the primary basis for the 1959 revision of the Index of Prices Paid Including Interest, Taxes, and Wages and for revision and updating of the estimates of farm production expenses and net farm income.

Survey of Farm Production Expenditures During 1971

The second comprehensive survey of farm production expenditures was conducted during February and March of 1972 with information obtained for expenditures during 1971. The survey was intended to represent the money expenditures made or incurred by all farm operators and their landlords during 1971. Expenses made or incurred while engaged in custom farmwork for others were included unless the custom business had no farmland or livestock and could be identified as a separate and distinct unit not associated with the farm operation. Expenditures by farm operators for nonfarm business or enterprises were excluded.

A two-stage multiple-frame sample was designed for the survey. Counties or groups of counties were selected in the first stage of sampling. These formed the primary sampling units (PSU's). A total of 329 PSU's were selected consisting of 397 counties. The second stage of sampling was the selection of farms within each PSU. The sample of farms within PSU's was drawn from two frames—an area frame and a list frame.

It was important that the large farms be sampled at a heavier rate than the small farms, as was done for the 1955 survey. However, a complete list of all farms that could be stratified by size was not available. Therefore, a list of commercial farms (sales of $20,000 or more) was developed and the area frame was used to estimate the incompleteness of the list. Because of the high cost of developing list and area frames, they were developed only in the selected counties.

After the primary sampling units were selected, an allocation for the list and area frames was made. The allocation to the two frames was done at the regional level and was weighted heavily by value of sales.

With some exceptions, single counties constituted the primary sampling units. If the farms within a county were so few that the within-county sampling rate for the large farms would be greater than 0.5, the county was combined with an adjacent county to form a primary sampling unit.

Screening questionnaires were used for the area segments and for the selected list operators to determine if the respondent qualified for a questionnaire and to define the total land operated. The definition of a farm followed that used by SRS and by the Bureau of the Census for the 1969 Census of Agriculture. The use of a multiple-frame sample design required that considerable information about the operating unit be obtained. This was necessary to determine which farms had a chance of being selected from each frame.

All expenditures for the farm, except certain ones paid by the landlord, were recorded on the farm operator questionnaire. A landlord questionnaire was used to obtain landlord expenses for insurance, taxes, interest, fencing expense, seed, fertilizer and lime, construction and maintenance of buildings, and other improvements.

Data were collected from farm operators and

landlords by personal interview. The expenditures were recorded for all goods and services purchased in 1971. This included the entire amount obligated, even though not completely paid in 1971. Expenses that were contracted in 1971 for goods and services to be received over a longer period, such as magazine subscriptions or casualty insurance, were included in full. Payments made in 1971 on goods and services delivered before 1971 were excluded. For personal or property taxes, the respondents were requested to report only the amount due in 1971, whether or not payment was made in 1971, and to exclude amounts paid to cover taxes due for prior years. Respondents were asked to report the entire outlay for new construction and additions to farm service buildings completed in 1971.

Financing charges and interest on installment purchases, delivery and installation charges, and sales and excise taxes were included as part of the total expenditure. Only net expenditures were recorded when trade-in allowances or discounts were part of the transaction, except for automobiles and trucks. For automobiles and trucks, the net expenditures were obtained by asking the total price, then deducting the trade-in allowance and discounts.

Several types of expenditures represent both family living and production expenses. For example, automobiles and trucks are commonly used for farm business purposes and personal travel; the cost of their purchase and operation cannot be wholly assigned to either production costs or family living expenses. This is also true of expenditures for fuel, utilities, insurance, interest, taxes, and some other expenses. Such expenses are often billed to the farm as a whole. For such combined expenditures, respondents were asked to allocate the expense between the farm share and the family living share.

The State Statistical Offices were responsible for the data collection in the field, the clerical review and editing of completed questionnaires, and keypunching of the data. In the Washington, D.C., office, the data were passed through identification and coding validation checks and then a computer edit using generalized programs. A multiple-frame estimating procedure was used to obtain the estimates of production expenditures along with sampling errors. The two-stage multiple-frame design proved to be efficient in terms of both cost and levels of sampling errors obtained.

Results of the farm production expenditure survey are published in several reports. Detailed expenditure data, total, average per farm, and percentage of farms reporting are published for the United States and three geographic regions: North, South, and West. Expenditures by economic classes of farm are published at the U.S. level, and data for selected items are shown by type of farm, also at the U.S. level.

The estimates obtained from the 1971 farm production expenditure survey provided new benchmark data for use by the Economic Research Service in revising the net farm income series. Average expenditure per farm for individual items and groups of items is the basic datum used in assigning and revising index weights for prices paid indexes.

Survey of Farm Family Living Expenditures During 1973

In 1973, the Statistical Reporting Service began a farm family living expenditure survey to provide data for use in revision of weights used in construction of the Index of Prices Paid by Farmers for Goods and Services, Including Interest, Taxes, and Farm Wages. The family living survey data would complement the data on farm production expenditures collected in 1972 for calendar year 1971. Together, the two surveys provide the basis for computing the relative importance of expenditures among goods and services used in farm production and family living.

A two-stage sample was designed for the family living survey. The first stage of sampling consisted of the selection of 121 counties. These formed the primary sampling units (PSU's). The second stage of sampling was the selection of segments from the Master Sample area frame within each PSU. A total of 1,761 segments were selected.

Family living expenditures are not as closely related to the size of farm as production expenditures. Therefore, it was not necessary to develop a list of large farms which could be sampled at heavier rates.

Respondents were interviewed three times over an 11-month period to reduce memory bias. The sample consisted of all farm operators residing in

the selected segments at the time of the first interview. These same farm operators were interviewed on the following two enumerations even if they had moved outside the segment.

The initial interviews, conducted in April 1973, established the number and identity of household members in the consuming unit, obtained a January 1 inventory for selected items, and obtained January through March expenditures. The second enumeration, made in July, covered April through June expenditures. The third and last enumeration in January and February 1974 obtained the July through December expenditures, certain annual expenses, and family income data.

The questionnaire used for the farm family living survey was basically the same as the questionnaire used by the Bureau of the Census to collect 1972 and 1973 consumer expenditure data for the Bureau of Labor Statistics. One booklet was used for all three enumerations.

The expenditures recorded were for total expenses incurred in 1973, whether or not all payments were completed during the year. If an item was purchased in 1972 but payment was made in 1973, the expense would not be recorded as a 1973 expenditure. Financing charges and interest on installment purchases, delivery and installation charges, and sales and excise taxes were included as part of the total expenditure. Only net expenditures were recorded and tabulated when trade-in allowances and discounts were part of the transaction.

Detailed expenditures for the entire year were obtained for all goods and services except food and beverages and some selected items, such as laundry and dry cleaning, and personal care items. Experience has demonstrated that it is extremely difficult to obtain reliable data for extended periods by direct interview for these kinds of expenditures. Questions were asked about the usual weekly or monthly expense at each of the interviews. Detailed food expenditures for food items were not obtained on this survey. USDA surveys of household food consumption and the weekly diaries kept by the consumer expenditure respondents in the survey made by the Bureau of the Census for the Bureau of Labor Statistics will be used as the basis for revision of weights for the food component of the prices paid indexes.

Several types of expenditures serve the dual purpose of family living and farm production. Examples are expenses for automobiles and trucks, fuel, utilities, insurance, and taxes. For these kinds of expenditures, the respondents were asked to estimate the percentage used for farm business, so that the farm share could be deducted in the tabulation, or to report only the amount which related to family living.

Eleven SRS State Statistical Offices were responsible for the data collection, editing, and keypunching. The Washington, D.C., office was responsible for data validation, computer edits, and survey summarization.

Annual Expenditure Surveys

In fiscal year 1973, the Statistical Reporting Service began a program of annual farm expenditure surveys. The annual surveys will provide data needed for regular periodic updating of weights for the Index of Prices Paid by Farmers for Goods and Services, Including Interest, Taxes, and Wages. These data will also provide the Economic Research Service with annual data not previously available to better estimate farm production expenses and net farm income. A 5-year cycle of surveys is planned. A survey of farm production expenditures will be conducted for 4 consecutive years and a family living expenditure survey in the fifth year.

The sampling plan for the annual farm production expenditure surveys is the same as that used for the 1971 survey. The sample design and estimating procedures are based on a two-stage multiple-frame sampling procedure. The area frame provides complete coverage of the universe and gives an independent estimate of all farm expenditures. The list frame provides a more efficient estimate of large-farm expenditures at a lower survey cost. Estimates from the list frame are weighted with the area frame to obtain the multiple-frame estimates of farm expenditures.

Each year a list of farm operators with annual sales exceeding $20,000 is developed by the State Statistical Offices for each of the primary sampling units (PSU's). These operators are classified according to their size and each size group is sampled at a different rate.

The United States was divided into three geographic regions—North, South, and West. Within

each region, PSU's were randomly divided into four groups. Each group of PSU's represents the entire region. The list frame provides about 50 percent of the respondents, and the area frame the remainder.

The annual farm production expenditure survey questionnaires have two forms. The global questionnaire asks for a breakdown of total expenditures by broad (global) categories. The detailed questionnaires, of which there are four, ask for expenses to be listed in detail for certain categories of expenditures. Each respondent is asked to provide expenditure information for the global questionnaire and for one of the four detailed questionnaires. This approach permits a larger sample and reduces the burden on individual respondents. The four detailed questionnaires combined are designed to cover all expenditure categories with questionnaire content grouped to equalize interviewing times. A landlord questionnaire is used to obtain information on expenditures by the landowner for such items as taxes, insurance, and building expenses, which most tenants would be unable to report.

One questionnaire version will be assigned to each PSU group each year. A 4 x 4 Latin square design is used so that over the period of 4 years each PSU will utilize each questionnaire version once. The global and landlord questionnaires are the same in all PSU's. ■

Chapter 11

OTHER COMMODITIES AND ACTIVITIES

INTRODUCTION

American agriculture is massive and diverse. Therefore, statistics and background information must be made available on a variety of elements ranging from those affecting production, such as fertilizer and the weather, to those that influence costs, such as farm labor and wages. Not all crops generate the interest of corn, soybeans, and wheat, but producers of minor commodities also need reliable estimates. This chapter brings together the statistical programs for several minor commodities, selected production inputs, and cold storage reports.

HONEY

Bees not only produce honey but are the only crop pollinators commercially controlled by man and transferable from one location to another.

Bee and honey statistics were first issued in 1940 by SRS and are currently included in two reports issued each year. The September release provides estimates of the number of colonies, yield per colony, and honey production from commercial operations in 20 States. A commercial operator is one controlling 300 or more bee colonies.

Table 18.—States preparing commercial honey production estimates—1974

Arizona	Iowa	North Dakota
California	Michigan	Oregon
Colorado	Minnesota	South Dakota
Florida	Montana	Texas
Georgia	Nebraska	Washington
Idaho	New York	Wisconsin
Illinois	North Carolina	

The January report contains estimates of the number of colonies, yield per colony, and production for the preceding year for all operations in all States and the Nation, wholesale and retail prices received by producers for all honey, value of honey production, stocks of honey held by producers in mid-December, and beeswax production, price, and value.

Number of Colonies

The estimate of the yearly change in the number of colonies is based primarily on nonprobability SRS sample surveys and State inspection records. The surveys are summarized to provide two main indications: Sample data expansions and current/current, or current/historical, ratios.

SRS maintains nearly complete lists of honey producers in each State, stratified by size of operation, for surveying and estimating purposes. During surveys, an attempt is made to obtain a complete response from all the largest producers and a return from a sample of the smaller operations.

Questionnaires mailed to producers for the September and December surveys ask about the number of colonies on hand at the beginning of the honey flow. The number reported by a respondent on the 20-State September inquiry is matched with the number reported by him a year earlier for that month. A summary of these matched reports provides an indication of change from the previous year called the C/C (current/current) ratio and is a basis for estimating the number of colonies in each State.

In addition to current year data, the 50-State December questionnaire asks for number of col-

onies on hand at the beginning of the honey flow the preceding (historical) year. A summary of the current number of colonies matched with the number reported for a year earlier on the same questionnaire provides another indication of the percentage change in colonies. This indication for the estimate is referred to as the C/H (current/historical) ratio.

The C/C and C/H indications from each stratum are combined by weighting each stratum indication by the portion each stratum represents of the total colonies in the universe. Each of these weighted indications for a series of years is plotted as the independent variable on graphs: the dependent variable is the actual percentage change in number of colonies from the preceding year.

A nonprobability control data expansion of the sample data is calculated from the September survey of producers as an indication of the number of bee colonies. Based on prior surveys and other data sources, a measure of the number of bee colonies controlled is assigned to each operator in the list universe. This number is the control data. The control-data expansion is obtained by computing for each stratum the proportion of the universe control data (number of bee colonies) that is represented in the sample and using this factor to expand the reporting data for each stratum. The stratum expansions are then added to form a State total expansion indication.

A nonprobability expansion of the sample data based on the number of honey-producing operations per stratum is calculated as an indication from the December survey. Prior to the survey, an independent measure of the number of operations is made for each stratum. The expansion is derived by computing for each stratum the proportion of the universe operations that is represented in the sample and using this factor to expand the reported number of colonies for each stratum. The stratum expansions are then added to form a State total expansion indication.

Data on number of colonies inspected are available from some State inspection agencies and are given consideration in making the estimates. The September estimates of colonies in commercial production are revised in January, based on the additional data received from the December survey.

Honey Production

The first estimate of the yield of honey per colony is made in September and is based on the amount of honey commercial producers have already taken and expect to take from the hives.

A final estimate is made in January when producers are asked for the amount of honey harvested from hives during the preceding year. The total reported pounds of honey produced annually is divided by the reported number of colonies to obtain an average yield per colony. The average yield for each size group is computed and weighted to arrive at a State average yield. The weighting is particularly important, because yield per colony is significantly higher for larger operations, which manage their colonies more effectively and move them from one location to another during the year.

The reported yields are summarized by strata and weighted by the proportion of total colonies in each stratum to arrive at a State average yield. The adopted yield per colony is multiplied by the estimated number of colonies to obtain the estimate of total honey produced for each State.

Beeswax Production

In January, an estimate is made of the amount of beeswax produced during the preceding year. The estimate is based on the reported amount of beeswax produced in relation to reported honey production and on the average pounds of beeswax produced per colony. A ratio indication of beeswax produced per stratum is derived by dividing the reported pounds of beeswax by reported total honey production. The ratio is then expanded into an estimate of beeswax production by multiplying the total honey production for the year by this ratio. The wax-per-colony ratio is obtained per stratum by dividing the reported pounds of beeswax produced by the reported number of colonies. Both indications are summarized by weighting the stratum ratios by the proportion of total colonies in each stratum.

Value of Production

Estimates of prices received by farmers for all honey and beeswax sold are published in January. The total price is obtained by combining reported prices for each size of container sold, both wholesale and retail. Quantities of honey sold are esti-

mated by categories for each State and are used as weights to obtain a price for all honey. The quantities are derived from pounds of honey sold in each category as reported on the December questionnaire and from other available sales data. These weights are also used to compute regional and U.S. average prices for wholesale and retail sales of extracted, comb, and chunk or bulk honey, and for all honey.

These average prices are multiplied by the quantity produced to derive value of honey production for each State and the United States. Value of beeswax production is derived in a similar manner. These value estimates are published in the January Honey Production report.

Stocks of Honey

Stocks of honey as of mid-December are estimated and published in January. A percentage indication of honey stocks is derived by dividing the total stocks reported by producers in the survey by the reported total pounds of honey produced. After the percentage of honey on hand is determined for each size group, a weighted percentage is obtained, then expanded into a stocks estimate by multiplying it by the total estimated honey production for the year.

COMMERCIAL FLORICULTURE

Commercial floriculture estimates, begun by SRS in 1957 in five States, were expanded to include 23 States by 1968. The 22 States now in the program are: California, Colorado, Connecticut, Florida, Illinois, Indiana, Iowa, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, New Jersey, New York (including Long Island), North Carolina, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Washington, and Wisconsin.

For SRS floriculture estimates, a commercial producer is one who annually grows and sells $10,000 or more of horticultural specialty crops.

SRS provides estimates for standard and miniature carnations, hybrid tea and miniature or sweetheart roses, standard and pompon chrysanthemums, gladioli, potted chrysanthemums, and foliage plants.

The estimates for each kind of cut flower cover the preceding year's number of producers; number of plants in production; blooms, bunches, or spikes sold; percentage of sales at wholesale; average wholesale price; average square feet in production; average value per square foot in production; and total value of sales. Similar information is also published for potted chrysanthemums and foliage plants. These data and grower production plans for the current year are included in an annual March report.

Sales value of the four cut flowers plus potted chrysanthemums and foliage plants in the current SRS program account for nearly two-thirds of the total value of sales from the top 22 floral crops in the United States. (See table 19.) The 22 States in this program account for about 90 percent of the total U.S. production.

Survey procedures involve mailing questionnaires each January to all growers on lists representing commercial floriculture growers in the 22 States. These lists are compiled through contacts with associations, trade publications, State departments of agriculture, and informed people working with the trade. Compilation and maintenance of these lists are critical in generating flower and foliage statistics.

Grower response to the flower and foliage surveys is exceptionally high. However, those firms failing to reply to the initial mailing are sent additional requests, which may be followed by telephone calls or personal visits to get their reports. Normally, these efforts leave only a few firms not responding. Estimates are made for these nonresponding firms. Reports received in SSO's are reviewed for completeness and compared with the preceding year's report. The reports are separated into eight strata based on total value of horticultural sales. Further checks are made to determine consistency and reasonableness, as judged by the previous year and trend data. The summary of reported data provides stratum and overall totals for each State.

Official estimates are based on the summation of reported and estimated data for the entire universe.

MAPLE SIRUP

Estimates of maple sirup production began in 1916. Output prior to the mid-1940's exceeded 2 million gallons annually, but since then has usually been below that level. Estimates are made for New York, Pennsylvania, Ohio, Michigan, Wisconsin, and all the New England States except

Table 19.—Flowers and foliage plants: Percent of producers and quantity sold by size group for each commodity by gross value of sales from all greenhouse and nursery products grown in 23 States, 1973

Commodity	Gross value of sales of selected greenhouse and nursery products grown [1]										Number of producers by commodity	Total quantity sold by commodity
	Under $50,000		$50,000–$99,999		$100,000–$249,999		$250,000–$499,999		$500,000 and over			
	Producers	Quantity sold	Producers	Quantity sold	Producers	Quantity sold	Producers	Quantity sold	Procuders	Quantity sold		
	Percent										Number	
Standard Carnations												1,000 blooms
1972	58	15	21	17	14	37	4	15	3	16	1,357	584,395
1973	54	12	24	22	16	36	4	15	2	15	1,198	616,051
Miniature carnations												1,000 bunches
1972	45	10	25	14	19	26	6	28	5	22	346	3,002
1973	38	9	26	14	24	46	7	18	5	13	299	3,301
Standard chrysanthemums												1,000 blooms
1972	65	17	18	23	11	35	3	12	3	13	1,955	137,144
1973	62	15	19	25	13	36	3	13	3	11	1,795	137,658
Pompon chrysanthemums												1,000 bunches
1972	66	10	17	13	11	25	3	22	3	30	1,912	33,649
1973	63	12	17	10	13	26	4	22	3	30	1,796	36,129
Gladioli												1,000 spikes
1972	66	11	13	6	11	22	5	26	5	35	271	273,244
1973	66	11	13	7	13	27	4	21	4	34	269	234,768
Hybrid tea roses												1,000 blooms
1972	19	2	19	5	28	22	15	20	19	51	317	309,596
1973	19	1	19	7	27	17	16	20	19	55	316	297,355

Miniature roses												1,000 blooms
1972	15	1	17	4	29	21	16	16	23	58	237	122,007
1973	13	1	16	4	31	19	17	16	23	60	239	120,413
Potted Chrysanthemums												1,000 pots
1972	53	7	21	9	15	26	6	17	5	41	1,359	19,141
1973	47	5	22	8	17	19	8	20	6	48	1,285	20,595
	Sq. ft. in production											Sq. ft. in production
Foliage plants												1,000 sq. ft.
1972	58	13	14	5	15	17	6	15	7	50	899	38,699
1973	54	5	16	6	15	14	8	20	7	55	1,048	45,447
All commodities [2]												
1972	59	.....	17	.....	14	.....	5	.....	5	.....	3,822	.....
1973	56	.....	19	.....	16	.....	5	.....	4	.....	3,810	.....

[1] Includes cut flowers, flowering and foliage plants, bedding plants, cultivated florist greens, nursery products, vegetables grown under glass.

[2] All commercial producers that grow one or more of the selected commodities listed above.

Connecticut; and include the amount of sirup produced, sold, and used on the farm; prices, and value of sales and production. The production estimates are published in May. Revisions, if necessary, are shown in the following January's annual summary in Crop Production. Disposition and value estimates for the crop marketing season are made in May of the year after production.

Questionnaires are mailed in the spring by State Statistical Offices to maple sirup producers. Survey indications relate to the annual change in number of taps, sirup production, and yield per tap. The percentage change derived from the survey is converted to indicated number of taps and indicated production by multiplying the preceding year's estimate by the survey percentage change. These computed values are then evaluated by use of regression charts to establish the estimate.

Percentages of production sold and used on farms where produced and prices received are computed from the fall maple sirup survey.

MINK

The number of mink pelts produced during the marketing year, the number of females bred to produce mink for pelts, and the number of mink ranches are estimated each May.

Estimates, which began in 1969, are based on a survey in late March and April of all known mink producers. Although surveys are conducted in all States, estimates are published only for those major producing States and the United States; minor producing States are combined into an "other States" category.

Estimates of number of pelts produced during the year and females bred are made according to the 12 basic color classes adopted by the mink industry: Standard, Demi-Buff, Pastel, Pale Brown, Sapphire, Gunmetal, Platinum, Pearl, Lavender Hope, Pink, Violet, and White.

The survey is designed as a multiple-frame probability sample, but because of the small number of mink ranches and the excellent cooperation and participation of these producers, a complete enumeration is usually accomplished.

NAVAL STORES

The term "naval stores" originated in colonial days when crude pine gum was converted to tar and pitch for caulking wooden ships and preserving ship rigging. The term is now used to include all products of pine gum and turpentine.

The statistical series on this industry began in 1947 when the program was transferred from the Bureau of the Census. Statistics by product are published monthly for production and stocks.

Turpentine production is shown in these categories: Gum, steam-distilled, and sulphate. Rosin is reported by gum, steam-distilled, and tall oil. Other products reported include pine oil and other steam-distilled terpenes. Prices of naval gum published by USDA's Market News Service and export-import information tabulated by the Bureau of the Census are issued in the monthly SRS Naval Stores publication.

Approximately 100 production plants report data monthly. In addition, a few large concentration firms complete mailed questionanires on production and stocks. Plants not returning a questionnaire by mail are telephoned to ensure as complete coverage as possible. In rare cases when the actual data cannot be obtained prior to the release deadline, estimates are made for the missing firm. When the following month's report is published, the actual data for the missing firm are used to correct the totals.

An annual report covering the crop year (April 1-March 31) is issued in May. This Naval Stores Annual Report summarizes the monthly statistics for the crop year. Annual data are collected from more than 300 processors, consumers, jobbers, and wholesalers. The inquiries supply data included in the annual summary on industrial consumption by use, stocks at industrial plants and distribution points, and still output of gum turpentine. Data collection procedures are very similar to those described above for the monthly report.

FARM LABOR AND WAGES

SRS has provided estimates of farm employment since 1909 and of farm wages since 1866. From 1909 through 1924, estimates of farm employment consisted of annual averages for the United States; from 1925 through 1933, monthly estimates were published for the Nation. In 1934, regional breakdowns were included; monthly estimates by States began in 1950 and were replaced by quarterly estimates in January 1975. Annual average wage

information was issued intermittently, beginning in 1866, and annually from 1909 through 1922. Starting in 1923, estimates were published quarterly for monthly, weekly, daily, and hourly wages. This series was replaced in 1975 by a more detailed quarterly series.

Survey Procedures

The nonprobability mail survey was the primary data collection method for both farm labor and wage information prior to 1975. In January of that year, SRS converted these programs to a quarterly probability survey based on the multiple-frame sampling concept in order to supply more accurate and more representative data for employment and wage estimates.

The necessity for the changeover became apparent as farms specialized and the mail survey lists no longer adequately represented the large or seasonal labor users. In an attempt to correct for this bias in the survey, an adjustment factor was applied in making the estimates. Although an annual review was made of this factor, it was increasingly difficult to accurately keep pace with the changing labor scene.

Overall, the survey now taken in January, April, July, and October measures the actual payrolls of more than 10,000 scientifically selected farms.

The list portion of the multiple-frame survey contains names and addresses of agricultural employers and is revised annually to keep it up-to-date. An independent sample of these farms, stratified by the number of workers, is selected each quarter, starting in July.

Farm operators identified in the preceding June enumerative survey are classified according to the peak number of workers hired during the preceding year or expected to be hired in the next 12 months. An independent sample is drawn each quarter, regardless of whether or not the operator had a chance of being selected from the list frame.

The farm labor portion of the survey still covers the number of family and hired workers, as well as average hours worked by farm operators, other unpaid family members, and hired workers.

However, some changes were made in the wage portion of the survey when probability sampling was introduced. Currently, the program represents 6 different types of work and 5 methods of pay, including 5 possibilities of perquisites. Wages by method of pay now include per hour for piece rate; other than piece rate; per hour only (perquisites also received); cash wages only (any method of pay but no perquisites received) and per hour receiving cash wages only (no perquisites). Also added was the classification of wages by type of work: Field and livestock, packing-house, machine operation, maintenance and bookkeeping, supervision, and other agricultural work. Although some workers do more than one job, the respondent classifies the worker according to what he did most of the time during the survey week.

The historical series on wage information represented nine categories: Per month with house, per month with board and room, per week with board and room, per week without board and room, per day with house, per day with board and room, per day without board and room, per hour with house, and per hour without board and room.

The quarterly farm labor and wage survey covers the week of the twelfth of the month, which matches the week specified in general employment and wage series constructed by other Government agencies. In the nonprobability approach, farmers usually reported employment for the last full week of the month. Additionally, for that system respondents reported prevailing wages the first of the month under various hiring arrangements in their localities.

The current survey questionnaire provides that workers must have been employed on the farm during the survey week. This means they may be counted as farmworkers more than once if they worked that week on two or more farms that fell into the multiple-frame samples; however, the number of hours worked and wages earned are not duplicated.

SRS defines "unpaid family workers" for survey purposes as the farm operator and members of his family, and any partners and their families that worked without pay. The operator is counted if he worked at least 1 hour during the week; partners or unpaid family members must work 15 hours or more.

Hired workers now include both family members who are paid and other paid workers who do agricultural jobs for 1 hour or more during the survey week. Previously, many family workers receiving wages may have been included only as unpaid family workers. Excluded from the hired

worker category are crew leaders and other agricultural service employees working on a fee or contract basis.

The present data collection system also removes the uncertainty surrounding what is and what is not considered agricultural work for survey purposes. In the past this was left to the respondents' judgment. Now SRS defines these jobs:

1. Feeding and caring for livestock and poultry.
2. Working in the fields, orchards, home gardens, and farm grounds.
3. Gathering eggs, cleaning milking machines, etc.
4. Planning work and keeping records for the farm or ranch.
5. Transporting feed, fertilizer, and other supplies to the farm if done by a person associated with the farm.
6. Maintaining and repairing machinery and other farm equipment.
7. Cutting firewood, fenceposts, timber, pulpwood, etc.
8. Work in greenhouses in connection with growing plants.
9. Work connected with preparing products for market if done on the farm and does not change the form of the product.
10. Hauling farm products from the field, farm headquarters, or farm shed to local market.
11. Performing exchange work on another farm.
12. Cooking, cleaning, and other housework, if the person receives cash wages paid by the farm operator.
13. Supervising persons doing the above activities.

Preparing Estimates

Labor and wage estimates for family and hired workers are obtained from the direct expansion indications from the quarterly survey. Since the area frame is a cross section of all farms, it adequately provides the basis for estimating number of farm operators and unpaid family workers. For estimating hired workers, both the area and list frames are used and weighted together. The weights are predetermined from earlier surveys to minimize the total sampling error. The area nonoverlap is then added to the combined list and area overlap expansion to establish the estimate for the universe as described in chapter 2. Time-series graphs are maintained to detect and eliminate unusual situations that adversely affect estimates based on these expansions. Weather conditions and work activities during the survey week are also taken into consideration in forming estimates.

Average hours worked by farm operators, unpaid family, hired workers, and all workers are derived by dividing the expanded hours worked by the expanded number of workers.

The current quarterly wage estimates are derived by dividing expanded data of total dollars paid by the total hours worked. All pay rates are converted to dollars per hour and include the amount paid to the employee before any deductions are made for taxes, insurance premiums, other benefits, or charges. In the estimating program, SRS makes no attempt to place a value on such perquisites as housing, room and board, or transportation.

Accuracy and Uses

The change in the information collecting and estimating program provides more accurate data with some sacrifice in timeliness for the farm labor portion. Quarterly instead of monthly reporting means that the estimates may not always reflect peak labor periods in some areas.

However, the probability sampling technique places farm labor and wage estimates on a firm statistical base with ascertainable coefficients of variation (C.V.). For example, the C.V. for State estimates of the number of hired workers ranges from 10 to 20 percent; for family workers, 7 to 15 percent; and for pay rates, 5 to 10 percent. On the national level, the C.V.'s for hired workers, family workers, and wages are less than 5 percent.

Farm labor and wage statistics are used by Government agencies, Congress, State legislators, farm organizations, and labor groups to indicate current employment and earnings and point out potential areas of change.

FERTILIZER

SRS publishes "fertilizer consumption" tonnages in monthly and annual reports. The tabulations are based on reports from State fertilizer

control officials, manufacturers, blenders, and sales outlets.

"Fertilizer consumption" is an industry term that describes the tonnages moving through various points in the supply chain from producers to retailers. At those times when fertilizer use is high relative to production, SRS consumption estimates are closely correlated with the amount of fertilizer actually applied to crops and other vegetation.

Fertilizer consumption statistics were begun in 1850 by the Bureau of the Census and continued until 1910. From 1911 to 1933, annual statistics were compiled by the National Fertilizer Association. USDA's Agricultural Research Service handled the task from 1934 through 1965, when the responsibility was transferred to SRS.

While all of the 48 contiguous States require various levels of the industry to report fertilizer tonnages at their point in the pipeline, the currency of the data and the period covered by the reports vary from State to State. In 1974, 17 States handling about half of all fertilizer reported had programs capable of providing SRS with tonnages on a monthly schedule. As other States revise their programs, they will be added to the SRS monthly series.

The SRS monthly reports indicate tonnages by each of the 17 States for nitrogen, phosphate, and potash individually and by mixtures, and by class, such as dry bagged, dry bulk, and liquid.

In the case of the November preliminary, May update, and June annual reports, 29 States have programs that supply sufficient data through their control officials so that little direct SRS contact with the industry is necessary. However, in the remaining States, SRS supplements responses from control officials with a mail survey of manufacturers, blenders, and sales agents.

Tonnages reported by State control officials are generally adopted by SRS for those States with adequate programs. The C/C percentage change provided by the survey of producers and others is the primary indication used to establish detailed estimates for the remaining States.

The November release covers all States and Puerto Rico for the year ending June 30. The publication includes estimates by States on fertilizer mixtures, direct application materials, primary nutrient tonnages of major materials, total organic materials, and secondary nutrient and micronutrient materials.

The May report includes the latest data available since the preliminary release and provides national details by principal grades and average primary nutrient content of mixtures and direct application materials. A supplement issued in June presents consumption by class: Bagged, bulk, and liquid.

NUMBER OF FARMS AND LAND IN FARMS

Annual estimates of farm numbers and land in farms by States began in 1910. Back to 1840, such information was issued in connection with the 10-year census of population.

The Department of Agriculture and the Census Bureau (which conducts the 5-year census of agriculture) use the same definition of a farm, although that definition has changed over the years, resulting in changes in farm numbers.

From 1925 through 1945, places were considered farms if they had 3 acres or more with agricultural operations. In 1920, places with less than 3 acres and value of products sold annually of less than $250 were counted as farms, provided they required the continuous service of at least one person.

In 1950, the definition required that a place meet one of two criteria in order to be classified as a farm. Places of 3 acres or more, and producing farm products with an annual sale value of $150 or more, excluding farm gardens, were classified as farms; or places with sales of $250 or more were classified as farms, regardless of the acreage.

Since 1959, places had to have 10 acres or more and sales of $50 or more; or sales of $250 or more, regardless of acreage, in order to be classified as farms. This change in definition resulted in about 6 percent fewer farms in 1959 than would have been included by using the definitions of prior years.

Estimates

Annual estimates of farm numbers and land in farms are published at the year's end. These include revised estimates for the year just ended and preliminary estimates for the year ahead.

Estimates, both revised and preliminary, are based mostly on the results of the June enumera-

tive survey. Farm censuses are conducted in some States and are given weight in estimating the number of farms and land in farms. Other sources and tabulations are used as check data. All these indications are plotted on a time-series chart for each State and the United States.

The direct expansion of resident farm operators is the primary indication used in arriving at a national estimate of farm numbers. The direct expansion indication from the June enumerative survey has a coefficient of variation of about 1 percent and the national estimate is within that range. Regional estimates are then set within the limits of the regional C.V.'s so that they will add up to the national estimates. State estimates are set and adjusted to equal the regional estimate.

The estimate of the average size of a farm is derived from various mail surveys and is used as a check on land in farms. The number of farms selling milk, or reporting hogs, cattle, or chickens are important inputs into the estimation of farms by livestock species, which must enter into the total farm estimate.

Once the revised estimates for the year just ended are established, preliminary estimates for the year ahead are made, based primarily on trend. The estimates of number of farms and land in farms are reviewed every five years when data from the census of agriculture become available. Consideration is given to comparisons with previous census results, changes in census survey procedures, and results of the census quality check that determines the extent of incompleteness or double coverage.

WEEKLY WEATHER AND CROP BULLETIN

The Weekly Weather and Crop Bulletin, published jointly by SRS and the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce, emphasizes the cumulative influence of weather on crops throughout the United States.

Weather conditions affect important operations such as planting and harvesting, and also critical stages of development when yield can be greatly influenced. Thus the bulletin meets a need for providing timely weather and crop information between regular monthly Crop Production reports and also for the period between a crop report survey and the release of the estimates.

The Pilgrims of Plymouth were keeping records of weather and its effect on crops as early as 1664. A century later, scientific farmers like George Washington and Thomas Jefferson were trying to draw conclusions from weather observations that might help in agriculture.

The origins of today's weather and crop reporting service lie in a pilot project undertaken by the Smithsonian Institution around 1845. The Smithsonian supplied special observational equipment to a network of cross-country telegraph operators who relayed weather data back to Washington.

The Smithsonian project was given to the U.S. Army's Signal Service in 1870, and 2 years later that group issued the first Weekly Weather Chronicle.

This bulletin has been published more or less continuously since that time, although it has undergone several name changes and had several different publishers in the intervening years as responsibility for civilian weather services shifted from the Army to USDA, and then to the Department of Commerce.

The Weekly Weather & Crop Bulletin, as the chronicle is now called, summarizes weather and crop information supplied by thousands of people in all parts of the Nation—about 3,000 county agents employed by USDA's Cooperative Extension Service; NOAA meteorologists; and thousands of weather observers and SRS crop reporters, mostly volunteers.

Each Monday during the growing season for most States (year-round for several States) SRS State Statistical Offices summarize the previous week's crop progress information sent in by county agents and crop reporters. At the same time, NOAA meteorologists in designated weather offices in each State (or State climatologists in a few States) summarize weekly weather observations received from rural observers and urban weather stations. The detailed weather and crop summaries are combined and released to the public by the SRS State Statistical Offices each Monday afternoon in State weekly weather and crop bulletins. A brief telegraphic advance report of this information is transmitted to the special Agricultural Climatology Service office in Washington, D.C., which is operated by SRS and NOAA.

There, a team of weather experts and an SRS crop statistician study the State reports along with weather and agricultural narrative summaries. The agricultural summary usually discusses small grains (primarily wheat), corn, cotton, soybeans, other field crops, vegetables, fruits, nuts, pastures, and livestock.

At noon each Tuesday, the national summaries are released to the news media. The bulletin itself, which includes the national summaries, State telegraphic reports, various charts and tables, and also world weather and farm news, is printed and mailed to subscribers.

Typically, for important crops, this bulletin includes information on percentage of crop planted or harvested, percentage of crop in various phenological phases (such as silking of corn or heading of wheat), descriptions of crop conditions and soil moisture supplies. Comparisons with previous year and 5-year averages are usually indicated also.

The bulletin includes U.S. maps and tables showing the week's total precipitation and departure of average temperature from normal; monthly and seasonal tabulations are published periodically. Soil moisture conditions, growing degree-days, depth of snow on the ground, and heating degree-days are presented in the appropriate season, along with the average monthly and seasonal weather forecasts. Available temperature and precipitation data from other parts of the globe are also presented, usually in map form.

COLD STORAGE

Early in the 1900's, allegations that cold storage warehouses were being used by some speculators to corner food supplies and drive up retail prices prompted a lengthy investigation by the Department of Agriculture. The Secretary of Agriculture recommended in 1911 that buyers, sellers, and the public be informed of the quantities of food in storage, through issuance of regularly scheduled monthly reports. Since that first report on apples in storage in 1914, the program has grown to include more than 100 different food items.

The food warehousing industry reports its inventories voluntarily each month; only during World Wars I and II was reporting mandatory, because of limitations placed on the use of refrigerated space for less critical food items.

A biennial survey of the complete universe of refrigerated warehouses is made on October 1 of each odd-numbered year to ascertain capacities of all known cold storage plants where food is generally stored for 30 days or more. Names and addresses are checked with trade associations, trade journals, State departments of agriculture, State departments of health, Federal agencies and others who deal with the food industry. Also, each State Statistical Office reviews the list of food warehouses in the State to make the survey as complete and accurate as possible.

In the mail survey, each operator is asked to classify his type of warehouse activity (public, semiprivate, and apple storage) and to report the cubic capacity of freezer rooms (0°F or lower) and cooler rooms (above 0°F). Follow-ups are made by a second mailing and telephone calls to nonrespondents.

These survey data are summarized into city, State, and national totals by cooler and freezer classifications for each type of warehousing activity.

Data for the monthly Cold Storage report are collected by mail questionnaires sent to each reporter on this list. The list is updated each month to include name changes, deletions, and new plant additions.

Monthly Cold Storage Report

Monthly inventories shown in the Cold Storage report are stocks immediately outside the retail pipeline. They include inventories in refrigerated facilities artificially cooled to 50°F or lower that generally hold food items for 30 days or longer. By definition, the Statistical Reporting Service does not estimate "working stocks" in refrigerated facilities owned and operated by wholesalers, jobbers, distributors, locker plants, chainstore warehouses, and similar types of businesses that generally hold food products less than 30 days. Excluded, too, are food supplies in refrigerated warehouses owned and maintained by the Armed Forces. However, when the military uses public warehouses for food storage, these inventories are reported by the warehousemen in their monthly report to the Statistical Reporting Service.

Data for the Cold Storage report come principally from:

- Public general warehouses that charge for storing food belonging to others.
- Private general warehouses used by producers, manufacturers, or processors for storing their own production but do not accept food commodities belonging to others.
- Semiprivate general warehouses used by producers, manufacturers, or processors for storing their own production and food commodities belonging to others.
- Apple houses (fruit houses): a facility (public, private, or semiprivate) used principally for storing apples and/or pears.

Questionnaires are sent from Washington headquarters about the 23d of each month to all refrigerated warehouses on the mailing list. Excluded are those warehouses storing only fish and reporting directly to the Department of Commerce; fruit warehouses closed down for the season; plants whose stocks are consolidated into a single report from corporate headquarters; and warehouses whose stocks are reported directly to a State or other Government agency that has a responsibility for collecting and reporting refrigerated food holdings.

The monthly questionnaire asks for end-of-month warehouse inventories of more than 100 fresh and frozen fruits and vegetables, nuts, dairy products, juices, poultry, and meats. In addition, public warehouses report on the utilization of their cooler and freezer space. This provides the public with an index of availability of storage space on a city, State, and national basis.

The monthly Cold Storage report provides regional and national totals of the various food items in storage. Stocks of apples, however, are published by major producing States.

Although there is a high response rate to cold storage survey questionnaires each month, any large and specialized units not responding are contacted by telephone. For warehouses that fail to report, SRS makes estimates of stocks based either on current/current (C/C) ratios indicated by those warehouses that reported up until the cutoff date, or on current/historical (C/H) indications. The reported stocks and estimated stocks are summarized and identified as the preliminary estimate stocks for the monthly Cold Storage report.

The preliminary monthly estimates are revised before the next release by substituting actual late-arriving data for that data estimated by SRS. The inclusion of late-reported data continues throughout the calendar year until the annual report is published the following year.

Special Surveys

Each January, March, and November, a special survey is made to provide a national summary of strawberry stocks by retail and institutional containers. Warehousemen report their inventories according to package size. At other times, only total inventories are reported.

Tree-nut stocks in shell and shelled are reported for two categories—pecans and "other nuts"—on each monthly questionnaire. In June, warehousemen are asked to provide their stocks of "other nuts" in shell and shelled: Almonds, filberts, and walnuts. The national summary is based on estimating procedures similar to those used for other commodities reported monthly.

Annual Reports

In March, revised estimates of food stocks for the previous year are published in Regional Cold Storage Holdings. During the year, revisions occur monthly because of reporting errors, the inclusion of stocks from new cold storage facilities, and deletion of estimated stocks in plants that went out of business but were not detected during the course of the year. These corrections, additions, and deletions constitute revisions in the regional and national report. The data in the annual report are not subject to any further revisions. ■

GLOSSARY

These definitions are intended to explain the common SRS usage of certain terms in the text and are not to be considered a definitive statistical glossary.

Area frame: A *sampling frame* that comprises the total land area involved in the survey and is divided into small parcels *(segments)* without overlap or omission, from which a sample of area segments can be selected.

Benchmark data: Data based on a complete or nearly complete enumeration which can be used to revise, if necessary, a previously established estimate. (Benchmark data are seldom available on a current basis.)

Biological yield: The gross or total amount of crop produced by the plants expressed as a rate per unit; e.g., bushels per acre and pounds per tree. (See *"net harvested yield".*)

Check data: Information derived from marketings, inspections, acreages contracted or certified, assessments, ginnings and other sources that has some direct relation to a commodity and can be used, with varying degrees of confidence, to supplement survey data in the preparation or revision of estimates.

Closed segment: A method of associating survey data with a *segment* that includes only the agricultural activities that are within the segment boundaries.

Composite estimator: An *estimator* derived from the combination of two or more separate *indications* for the same characteristic. (The weights used in combining the different indications are predetermined.)

Count limb: A randomly selected tree limb on which fruit or nut counts are made.

Count unit: In crop objective yield surveys, a small randomly selected sample plot in which counts, measurements, and observations are made on plants.

Crop reporters: Persons who voluntarily report information about their farms or localities for use in the SRS forecasting and estimating programs.

Crop Reporting Board: A group of SRS statisticians consisting of a permanent chairman (the Deputy Administrator of SRS), a permanent secretary, and other members designated by the chairman to review all available survey and check data for the purpose of establishing the official State and/or national agricultural estimates.

Crop reporting district: A geographic area composed of an SRS grouping of contiguous counties having relatively similar agricultural characteristics. (Most States are assigned nine districts.)

Current/current ratio (C/C): A survey *indication* of change from a previous survey period, obtained by dividing currently reported data by data reported for the same reporting units in the preceding survey. Also called *"identical ratio."*

Current/historical ratio (C/H): A survey *indication* of change from the previous year, obtained by dividing the current year's data by the reporters' current estimates of similar data for the preceding year. Data for both years are reported on the same questionnaire.

Direct expansion: An unbiased *estimator* that involves multiplying the sample data by the reciprocal of the probability of selection of the sampling unit. The summation of expanded data for all selected sampling units is the direct expansion estimate of the population.

Enumeration: In a sample survey, the collection and recording of statistical information for all of the selected sampling units.

Enumerative survey: An area frame survey that obtains statistical information for the selected sampling units by personal interviews with the respondents.

Enumerator: 1. A person employed specifically to obtain information on sampling units by personal or telephone interviews with respondents. Also called "interviewer."

2. A person employed specifically to make counts, measurements, and observations in sample plots of field crops or on count limbs of tree crops for objective yield surveys.

Estimate: An approximate measure of the actual quantity of an item, usually derived by calculation from sample data.

Estimator: A rule, method, or formula for generating estimates from sample data.

Expansion factor: The reciprocal of the probability of selection of the sampling unit, used to multiply the data of the sampling units and thus give, by their summation, the *direct expansion* estimate.

Forecast: A quantitative evaluation of probable final outturn, based on current conditions and the assumption that normal growth and harvesting conditions will prevail from the time of forecast through harvest.

Identical ratio: Same as *current/current ratio.*

Indication: A numerical value calculated from survey data used directly or interpreted through regression charts to establish estimates.

Intentions: A quantitative estimate of probable future action to be taken based on current plans reported by respondents; e.g., area to be seeded to corn, number of sows to be farrowed.

Limited forecast or estimate: A program in which the number of forecasts or estimates made during the season is fewer for minor producing States than for major producing States. Minor producing States are defined as those that individually produce less than 1 percent, and in the aggregate less than 5 percent, of the U.S. commodity total.

List frame: A *sampling frame* that consists of a list of individuals, businesses, or other entities from which a sample can be selected. (A list of the names and addresses of farm operators is an example of a list frame frequently used by SRS.)

Mail survey: A survey using questionnaires that are mailed to intended respondents, who are asked to fill them out and return them by mail. (In probability mail surveys, nonrespondents are interviewed by personal visit or by telephone to obtain the required data.)

Multiple-frame survey: A survey in which the sample is selected from two or more *sampling frames* (usually an area frame and a list frame).

National Board: A designated group of SRS statisticians selected from the *Crop Reporting Board* who meet to establish regional and national estimates for a specific commodity.

Net harvested yield: The portion of total crop production harvested and recovered, expressed as a quantity per unit of area, derived by deducting harvesting and other losses from the *biological yield.*

Nonoverlap domain: In multiple-frame sampling, that portion of the area frame population that is not in the list frame.

Nonprobability survey: A survey in which the sampling procedures are not based on the probabilities of selection. (The most common example is a mail survey that uses incomplete sampling frames.)

Nonresponse: The lack of a response, such as the failure of a respondent to reply to a survey inquiry.

Objective yield survey: A scientifically designed survey of small, randomly selected crop areas (sample plots) in which measurements, counts, and observations are made in order to forecast or estimate yield.

Open segment: The method of associating survey data with a *segment* that includes all agricultural activities of farms whose headquarters are located inside the segment boundaries, even though some of the activity may be outside the segment boundaries.

Overlap domain: In multiple-frame sampling, that portion of the area frame population that is also included in the list frame.

Parity Index: An index of prices paid by farmers for commodities and services, including payments of interest, taxes, and wages, using the period 1910-14 = 100 as the base.

Parity price: The price that gives a unit of a farm commodity the equivalent purchasing power it had in the period 1910-14.

Parity ratio: The ratio of the Index of Prices Received by Farmers to the Parity Index, with both indexes using 1910-14 = 100 as the base.

Probability survey: A survey in which every element in the population has a known, nonzero probability of being selected for the sample. (Data must be obtained, insofar as possible, for all sampling units selected.)

Projection: A quantitative expectation of some future value, based on historical data relations and possibly current circumstances, but not on current survey data as is a forecast.

Ratio estimator: Any *estimator* that uses a ratio as a multiplier of a known or estimated base. (In practice, the ratio is derived from survey data.)

Ratio relative: A survey *indication* of change obtained by dividing a current-year survey ratio (such as the ratio of a specific crop acreage to total land) by the comparable survey ratio for the preceding year.

Ratio to base: A ratio *estimator* whose divisor or "base" is known in advance and is part of the sampling frame.

Recommendations: Preliminary values recommended by commodity specialists in State Statistical Offices for adoption as final values by SRS and that are subject to revision and reconciliation by the *Crop Reporting Board* before being published as final official estimates.

Record linkage: The process of identifying by computer techniques any duplication of names on one or more lists.

Regression chart: A graph that shows the historical relations between sample survey *indications* and the corresponding final estimates, and that is used to prepare a current forecast or estimate from survey indications.

Remote sensing: The detection of information from a (usually great) distance; especially, the detection and transmission of desired information by means of a space vehicle, such as the Earth Resources Technology Satellite (ERTS).

Sampling frame: A set (or a list) of *sampling units* in a survey population, ideally having no duplication or omission of units, from which samples may be drawn.

Sampling unit: One of the units into which a survey population is divided and that is subject to being randomly selected as part of a sample.

Segment: A piece of land, generally between one-half and 4 square miles in area, with boundaries identifiable on a map and on the ground, that is considered to be the primary *sampling unit* used in SRS area frame sampling.

Speculative commodities: Commodities that are so designated (because they are traded on organized commodity exchanges) by official regulations of the Department of Agriculture

and whose forecasts and estimates are prepared under special security precautions. (In 1975, these commodities are: Sweet oranges, corn, cotton, oats, soybeans, and wheat.)

Time-series chart: A graph that shows the change in one or more variables over a period of time.

Tract: The area of land located within a *segment* that is under a single operation or management.

Weighted segment: The method of associating survey data with a *segment* that apportions a farm's activities to the segment by the fraction of the farm's acreage that lies within the segment boundaries.

APPENDIXES

Chronology

1839 Congress appropriates $1,000 to Patent Office for "collection of agricultural statistics and distribution of seeds."

1841 Using 1840 Agricultural Census, Patent Office issues first crop report. Annual releases continue until 1848.

1855 President of Maryland Agricultural Society proposes that all State agricultural societies appoint men in each county to report on crops.

1858 Editor of "American Agriculturalist" asks subscribers for crop comments and publishes his appraisal. In 1862, he sends questionnaires to these reporters.

1862 U.S. Department of Agriculture established.

1863 Division of Statistics formed in USDA as predecessor of today's SRS.

First monthly crop report issued by USDA in July showing May-June conditions reported by 2,000 farmer-correspondents.

1866 Beginning of continuous series of reports on major crops, livestock, and agricultural prices.

1882 Part-time statisticians appointed to develop and maintain group of voluntary crop reporters and provide current information on agriculture.

1892 Now 15,000 farmer-reporters provide monthly data, and 125,000 furnish data for annual estimates.

1896 Opening of Rural Free Delivery Service paves way for speedier reports from farmers and new township correspondents.

1898 More statisticians assigned, plus traveling agents to observe farming conditions and provide coordination among States for estimates.

1903 In addition to crop reporters, 61,000 ginners, 24,000 millers and elevatormen, and 22,000 agents of railroads and transportation companies report on agriculture.

1905 Crop Reporting Board, a group of highly qualified agricultural statisticians from Washington and field offices, established to review information and set national and State estimates.

1908 Monthly reports begin on prices farmers receive for their products.

1909 Congress specifies which crops will be covered in crop report, stipulates issuance times, and requires Secretary of Agriculture to sign report.

Statisticians, staff, and other workers prohibited by law from making premature disclosure of crop estimates, issuing false reports, or speculating on commodity market.

Beginning of reports on wages paid to hired farm labor.

1910 Annual report released on prices paid by farmers for 74 commodities.

First monthly index of prices received by farmers covers 10 items.

Shift from reporting monthly crop conditions to forecasting actual production during the growing season for all major crops except cotton.

1914 Part-time statisticians upgraded to full-time jobs under Civil Service.

Commercial vegetable and Cold Storage reports begin.

1915 Cotton production forecasts now available during growing season.

1917 Wisconsin signs first formal agreement establishing cooperative Federal-State crop estimating program. (Agreements exist with 48 States by 1967.)

Manufactured dairy products surveys initiated.

1919 South Carolina statistician does first field work on objective measurements of crop acreages (now a significant element in SRS crop estimating).
Annual poultry survey starts.

1922 Rural mail carriers distribute first pig crop survey questionnaires.

1923 Annual report showing farmers' spring planting intentions issued in March.

Crop meter, a device attached to an automobile odometer, invented by Mississippi statistician to measure crop frontages as acreage guide.

Livestock reporting work reorganized and expanded.

1924 Rural mail carrier system used to distribute questionnaires on crop acreages.

1925 First 5-year census of agriculture taken; previously taken every 10 years.

1926 Quarterly estimates of farm stocks of grain start.

1927 Statisticians required to take special training to improve skills.

1928 Objective measurements for forecasting yield start with cotton; corn and wheat later, but are discontinued at the start of World War II.

1933 Statistical agency provides assistance in reviewing crop acreages and hog numbers for allotment program under Agricultural Adjustment Act.

1936 Volume of USDA farm data prompts separate annual publication titled "Agricultural Statistics."

1941 Chicago dairy office established for weekly reports on butter, cheese, and other dairy products.

1943 Quarterly estimates of grain stocks off farms in mills and elevators begin.

1944 Master Acreage Sample of agriculture drawn at Iowa State University with SRS help to aid in developing probability acreage surveys.

1945 Forerunner of today's enumerative surveys launched with interviews of 20,000 farmers in 158 counties and 42 States concerning farm labor.

1950 SRS opens program to provide on-the-job training to junior and senior agricultural college students.

1951 Technical assistance to foreign countries in the collection, tabulation, analysis, and use of agricultural statistics greatly expands. This work has continued to grow as a dynamic activity.

1952 SRS estimating program strengthened with funds for research on methods for developing and improving statistical techniques.

1954 June enumerative survey of crop acreages opens on research basis in 10 States, 100 counties, and 703 segments.

Experimental objective yield measurements of cotton made in 200 sample units of 76 counties in 10 States. Similar work starts on corn the same year; wheat in 1955; soybeans in 1956.

1961 Objective yield surveys for cotton and corn become operational, providing the Crop Reporting Board with additional indications of yield per acre. Wheat objective yield survey goes operational in 1962; soybeans in 1967.

SRS, Iowa State, and North Carolina State universities set up program to offer specialized training for SRS statisticians.

1962 Statistical Reporting Service began use of computers—Data Processing Branch created.

1965 Crop Reporting Board for the first time establishes national and regional acreage estimates before review of State estimates.

June enumerative survey operational in 48 States, providing first probability survey of crop acreages at the national level.

1966 Continuous crop and livestock estimating program enters second century.

1967 Washington Data Processing Center, serving computer for USDA agencies and many outside Department, opens under SRS.

First Quarterly Farm Labor Survey conducted as a pilot program.

1969 Probability grain stocks surveys conducted for first time.

1970 Multiple-frame survey methods added to cattle and hog estimating procedures.

1972 Chicago Dairy Office closed and workload transferred to State Statistical Office, Madison, Wisc., and Livestock, Dairy and Poultry Branch, Estimates Division, Washington, D.C.

Washington Data Processing Center transferred to Office of Automated Data Systems, USDA, as part of a consolidation of ADP facilities.

1974 Quarterly Farm Labor Survey becomes operational.

Laws Governing Crop Reports

(All references are to United States Code)

GENERAL

Title 7, Section 2202

The Department of Agriculture shall be an executive department under the supervision and control of a Secretary of Agriculture, who shall be appointed by the President, by and with the advice and consent of the Senate.

Title 7, Section 2204

The Secretary of Agriculture shall procure and preserve all information concerning agriculture which he can obtain by means of books and correspondence and by practical and scientific experiments, accurate records of which experiments shall be kept in his office, by the collection of statistics, and by any other appropriate means within his power; he shall collect new and valuable seeds and plants; shall test, by cultivation, the value of such of them as may require such tests; shall propagate such as may be worthy of propagation; and shall distribute them among agriculturists.

Title 7, Section 411a

Monthly crop report; contents; issuance; approval by Secretary of Agriculture.—The monthly crop report, which shall be gathered as far as practicable from practical farmers, shall be printed and distributed on or before the twelfth day of each month, and shall embrace statements of the conditions of crops by States, in the United States, with such explanations, comparisons, and information, as may be useful for illustrating the above matter, and it shall be submitted to and officially approved by the Secretary of Agriculture, before being issued or published.

Title 18, Section 1902

Disclosure of crop information and speculation thereon.—Whoever, being an officer, employee or person acting for or on behalf of the United States or any department or agency thereof, and having by virtue of his office, employment or position, become possessed of information which might influence or affect the market value of any product of the soil grown within the United States, which information is by law or by the rules of such department or agency required to be withheld from publication until a fixed time, willfully imparts, directly or indirectly, such information, or any part thereof, to any person not entitled under the law or the rules of the department or agency to receive the same; or, before such information is made public through regular official channels, directly or indirectly speculates in any such product by buying or selling the same in any quantity, shall be fined not more than $10,000 or imprisoned not more than ten years, or both.

No person shall be deemed guilty of a violation of any such rules, unless prior to such alleged violation he shall have had actual knowledge thereof.

Title 18, Section 1905

Disclosure of confidential information generally.—Whoever, being an officer or employee of the United States or of any department or agency thereof, publishes, divulges, discloses, or makes known in any manner or to any extent not authorized by law any information coming to him in the course of his employment or official duties or by reason of any examination or investigation made by, or return, report or record made to or filed with, such department or agency or officer or employee thereof, which information concerns or relates to the trade secrets, processes, operations, style of work, or apparatus, or to the identity, confidential statistical data, amount or source of any income, profits, losses, or expenditures of any person, firm, partnership, corporation, or association; or permits any income return or copy thereof or any book containing any abstract or particulars thereof to be seen or examined by any person except as provided by law;

shall be fined not more than $1,000, or imprisoned not more than one year, or both; and shall be removed from office or employment.

Title 18, Section 2072

False crop reports.—Whoever, being an officer or employee of the United States or any of its agencies, whose duties require the compilation or report of statistics or information relating to the products of the soil, knowingly compiles for issuance, or issues, any false statistics or information as a report of the United States or any of its agencies, shall be fined not more than $5,000 or imprisoned not more than five years, or both.

COTTON

Title 7, Section 471

Statistics and estimates of grades and staple length of cotton; collection and publication.—The Secretary of Agriculture is authorized and directed to collect and publish annually, on dates to be announced by him, statistics or estimates concerning the grades and staple length of stocks of cotton, known as the carry-over, on hand the 1st day of August of each year in warehouses and other establishments of every character in the continental United States; and following such publication each year, to publish, at intervals in his discretion, his estimate of the grades and staple length of cotton of the then current crop: Provided, That not less than three such estimates shall be published with respect to each crop. In any such statistics or estimates published, the cotton which on the date for which such statistics are published may be recognized as tenderable on contracts of sale of cotton for future delivery under the United States Cotton Futures Act, shall be stated separately from that which may be untenderable under said act.

Title 7, Section 476

Acreage reports.—The Secretary of Agriculture shall cause to be issued a report on or before the 12th day of July of each year showing by States and in toto the estimated acreage of cotton planted, to be followed on or before the 12th day of August with an estimate of the acreage for harvest and on or before the 12th day of December with an estimate of the harvested acreage.

Title 7, Section 475

Cotton crop reports.—The Secretary of Agriculture shall cause to be issued as of the first of each month during the cotton growing and harvesting season from August to January inclusive, reports describing the condition and progress of the crop and stating the probable number of bales which will be ginned, these reports to be issued simultaneously with the cotton-ginning reports of the Bureau of the Census relating to the same dates, the two reports to be issued from the same place at 3 o'clock postmeridian on or before the 12th day of the month to which the respective reports relate. No such report shall be approved and released by the Secretary of Agriculture until it shall have been passed upon by a cotton-crop reporting board consisting of five members or more to be designated by him, not less than three members of the board shall be supervisory field statisticians of the Department of Agriculture who are located in different sections of the cotton-growing States, are experienced in estimating cotton production and have first hand knowledge of the condition of the cotton crop based upon recent field observations. A majority of the members of the board shall be familiar with the methods and practices of producing cotton.

Title 12, Section 1141j(d)

Governmental publication; predictions as to cotton prices prohibited.—The inclusion in any governmental report, bulletin, or other such publication hereafter issued or published of any prediction with respect to cotton prices is prohibited. Any officer or employee of the United States who authorizes or is responsible for the inclusion in any such report, bulletin, or other publication of any such prediction, or who knowingly causes the issuance or publication of any such prediction, shall, upon conviction thereof, be fined not less than $500 or more than $5,000, or imprisoned for not more than five years, or both: Provided, That this subdivision shall not apply to the Governor of the Farm Credit Administration when engaged in the performance of his duties herein provided.

Annual appropriation acts contain a similar prohibition in this form, "No part of the funds appropriated by this Act shall be used for the payment of any officer or employee of the Department who, as such officer or employee, or on behalf of the Department of any division, commission, or bureau thereof, issues, or causes to be issued, any prediction, oral or written, or forecast, except as to damage threatened or caused by insects and pests, with respect to future prices of cotton or the trend of same." Pub. L. 87-879, Oct. 24, 1962.

Title 13, Section 42

Contents of reports; number of bales of linter; distribution; publication by Department of Agriculture.—

(a) The statistics of the quantity of cotton ginned shall show the quantity ginned from each crop prior to August 1, September 1, September 15, October 1, October 15, November 1, November 15, December 1, December 15, January 1, January 15, February 1, and March 1; but the Secretary may limit the canvasses of August 1 and September 1 to those sections of the cotton-growing States in which cotton has been ginned.

(b) The quantity of cotton consumed in manufacturing establishments, the quantity of baled cotton on hand, the number of active consuming cotton spindles, the number of active spindle-hours, and the statistics of cotton imported and exported shall relate to each month, and shall be published as soon as possible after the close of the month.

(c) In collecting and publishing statistics of cotton on hand in warehouses and other storage establishments, and of cotton known as the "carry-over" in the United States, the Secretary shall ascertain and publish as a separate item in the report of cotton statistics the number of bales of linters as distinguished from the number of bales of cotton.

(d) The Secretary shall furnish to the Department of Agriculture, immediately prior to the publication of each report of that Department regarding the cotton crop, the latest available statistics hereinbefore mentioned, and the Department of Agriculture shall publish the same in connection with each of its reports concerning cotton.

Tiltle 13, Section 43

Records and reports of cotton ginners.—Every cotton ginner shall keep a record of the county or parish in which each bale of cotton ginned by him is grown and report at the completion of the ginning season but not later than the March canvass of each year a segregation of the total number of bales ginned by counties or parishes in which grown.

Title 13, Section 44

Foreign cotton statistics.—In addition to the information regarding cotton in the United States provided for in this subchapter, the Secretary shall compile, by correspondence or the use of published reports and documents, any available information concerning the production, consumption, and stocks of cotton in foreign countries, and the number of cotton-consuming spindles in such countries. Each report published by the Department of Commerce or agency or bureau thereof regarding cotton shall contain an abstract of the latest available information obtained under the provisions of this section, and the Secretary shall furnish the same to the Department of Agriculture for publication in connection with the reports of that department concerning cotton in the same manner as in the case of statistics relating to the United States.

Title 13, Section 45

Simultaneous publication of cotton reports.—The reports of cotton ginned to the dates as of which the Department of Agriculture is also required to issue cotton crop reports shall be issued simultaneously with the cotton crop reports of that department, the two reports to be issued from the same place at 3 o'clock postmeridian on or before the 12th day of the month to which the respective reports relate.

APPLES
Title 7, Section 411b

Estimates of apple production.—Estimates of apple production shall be confined to the commercial crop.

NAVAL STORES
Title 7, Section 2248

Statistics relating to turpentine and rosin.—The Secretary of Agriculture is authorized and directed to collect and/or compile and publish annually, and at such other times, and in such form and on such date or dates as he shall prescribe, statistics and essential information relating to spirits of turpentine and rosin produced, held, and used in the domestic and foreign commerce of the United States.

PEANUTS
Title 7, Section 951

Collection and publication; facts required; submision of report.—The Secretary of Agriculture is authorized and directed to collect and publish statistics of raw peanuts, shelled, unshelled, and crushed, and peanut oil, in the United States, received, processed, shipped, and owned by or in the possession of warehousemen, brokers, cleaners, shellers, dealers, growers' cooperative associations, crushers, salters, manufacturers of peanut products, and owners other than the original producers of peanuts: Provided, That the Secretary may, in his discretion, omit for any period of time to collect such statistics from any or all salters of peanuts or manufacturers of peanut products who used, during the calendar year preceding that for which statistics are being collected, less than thirty thousand pounds of shelled and unshelled peanuts. Such statistics shall show the quality of peanuts in such details as to kinds —Virginias, Runners, Spanish, and imported varieties—as the Secretary shall deem necessary for the purposes of this chapter. All reports except those required from persons owning or operating peanut picking or threshing machines shall be submitted monthly in each year, except as otherwise prescribed by the Secretary.

TOBACCO
Title 7, Section 501

Collection and publication; facts required; deteriorated tobacco.—The Secretary of Agriculture is authorized and directed to collect and publish statistics of the quantity of leaf tobacco in all forms in the United States and Puerto Rico, owned by or in the possession of dealers, manufacturers, quasi-manufacturers, growers' cooperative associations, warehousemen, brokers, holders, or owners, other than the original growers of tobacco. The statistics shall show the quantity of tobacco in such detail as to types, groups of grades, and such other subdivisions as to quality, color, and or grade for particular types, as the Secretary of Agriculture shall deem to be practical and necessary for the purposes of this section and sections 502 to 508 of this title, shall be summarized as of January 1, April 1, July 1, and October 1 of each year, and an annual report on tobacco statistics shall be issued: Provided, That the Secretary of Agriculture shall not be required to collect statistics of leaf tobacco from any manufacturer of tobacco who, in the first three quarters of the preceding calendar year, according to the returns of the Commissioner of Internal Revenue or the record of the Treasurer of Puerto Rico, manufactured less than thirty-five thousand pounds of tobacco, or from any manufacturer of cigars who, during the first three quarters of the preceding calendar year, manufactured less than one hundred and eighty-five thousand cigars, or from any manufacturer of cigarettes who, during the first three quarters of the preceding year, manufactured less than seven hundred and fifty thousand cigarettes: And provided further, That the Secretary of Agriculture may omit the collection of statistics from any dealer, manufacturer, growers' cooperative association, warehouseman, broker, holder, or owner who does not own and or have in stock, in the aggregate, fifty thousand pounds or more of leaf tobacco on the date as of which the reports are made. For the purposes of this section and sections 502 to 508 of this title, any tobacco which has deteriorated on account of age or other causes to the extent that it is not merchantable or is unsuitable for use in manufacturing tobacco products shall be classified with other nondescript tobacco and reported in the "N" group of the type to which it belongs.

USDA Regulations Governing Crop Reports

The official regulations of the Department of Agriculture concerning the preparation of the agricultural data estimates of the Service follow:

Title 1—General Authorities and Functions

Chapter 6—Other Authorities and Functions

Section 1—Crop Reporting Board

325. AUTHORITIES AND FUNCTIONS. (S)—There shall be in the Statistical Reporting Service a Crop Reporting Board, the primary function of which shall be to prepare and issue, as provided in paragraph 328 and elsewhere in this regulation, the official State and National estimates and reports of the Department relating to crop production, livestock and livestock products, numbers of livestock on farms, stocks of agricultural commodities, local market prices, value of farm products, and such other subjects as the Administrator of the Statistical Reporting Service may direct. Among these reports shall be a Monthly Crop Report, which shall be issued on or before the 12th of each month pursuant to 7 U.S.C. 411a, a Cotton Acreage Report to be issued on or before the 10th of July, and the Cotton Crop Report to be issued on the 8th day of each month from August to December, or, if the 8th day is a nonwork day, on the next succeeding workday, pursunt to 7 U.S.C. 475 and 476.

326. DEFINITIONS.—As used in these regulations, "Department" means the United States Department of Agriculture, "Service" means the Statistical Reporting Service staff engaged in statistical reporting work, and "Board" means the Crop Reporting Board.

327. ORGANIZATION OF BOARD. a. *Chairman.*—The Deputy Administrator of the Statistical Reporting Service is the Chairman of the Board. He shall call and preside over all meetings of the Board. As Deputy Administrator of the Statistical Reporting Service, he shall issue the necessary instructions for gathering, compiling, and summarizing data for reports specified in paragraph 328, and shall approve the statistical techniques and procedures to be followed by the Service and by the Board in analyzing, interpreting, and reviewing the pertinent data and in preparing the official estimates for each report.

b. *Members.*—The Chairman shall select the members of the Board for each report from the Service. The Board, for the Monthly Crop Report, shall have not less than five members in addition to the Chairman, and except for February, March and December, not less than two of them shall be selected from the Service field offices. For the Cotton Report the Board shall have not less than five members in addition to the Chairman, of whom not less than three members shall be supervisory field statisticians located in different sections of the cotton growing States, experienced in estimating cotton production and who have first-hand knowledge of the condition of the cotton crop based on recent field observations, and a majority of the Board shall be familiar with the methods and practices of producing cotton, as provided in the Act of May 3, 1924, as amended (7 U.S.C. 475). For the Annual Crop Production Summary in December, the Winter Wheat and Rye Report as of December 1, the Prospective Plantings Report as of March 1, the Annual Livestock Summary as of January 1, and the Pig Crop Reports as of June 1 and December 1, the Board shall consist of not less than five members, in addition to the Chairman, of whom not less than two shall be selected from the Service field offices.

c. *Secretary of the Board.*—The Board shall have a permanent Secretary, who shall be a professional member of the Service in Washington. He shall assist in preparing instructions and forms for collecting, compiling, summarizing, and analyzing statistical information for the use of the Board, shall arrange for suitable means for transmission of instructions, records, and reports to and from the field offices, shall maintain records of the information assembled, including a record

of the official estimates prepared by the Board, and shall maintain a file of the signed copies of Board reports. For each report the Secretary shall assemble and collate information for the use of the Board, issue proper notices of Board meetings, and make necessary arrangements for the preparation, signing, and release of reports in such manner and at such times as are herein described.

328. REPORTS. a. *Reports to be approved by the Secretary of Agriculture.*—The following Board reports shall be signed by the Chairman, Secretary, and members of the Board, and shall be approved by the Secretary of Agriculture before being issued or published:

Monthly Crop Reports (see paragraph 325).
Cotton Reports (see paragraph 325).
Annual Crop Production Summary in December.
Winter Wheat and Rye Report as of December 1.
Prospective Plantings Report as of March 1.
Annual Livestock Summary as of January 1.
Pig Crop Reports as of June 1 and December 1.

b. *Other Board reports.*—Such other reports as are designated by the Chairman shall be prepared and issued as Board reports. For each such report, the Chairman shall select Board members from the Service in such manner and in such numbers as may be deemed necessary. Such reports shall be approved by the Chairman or his designee before being issued.

c. *Annual release schedule.*—On or before the first day of December of each year there shall be prepared a schedule for the ensuing year setting forth dates and hours of release of all regular statistical reports listed in subparagraph "a" above for which the approval of the Secretary of Agriculture is required. The schedule of reports shall be effective when approved by the Secretary of Agriculture and may be amended at any time with his approval. Subsequently, there shall also be prepared and issued, to the extent possible, an advance listing of the reports referred to in subparagraph "b" above, together with dates of publication or issuance.

329. COLLECTION OF INFORMATION. — For use in preparing the official estimates of the Department, information relating to agriculture shall be gathered through the Washington and field offices of the Service, as far as practicable, from practical farmers, as provided in 7 U.S.C. 411a; from peanut processors, as provided in 7 U.S.C. 951 et seq.; from processors, dealers, cooperating State and local officials, agencies in the Department; and from other sources. This information shall be collected by mailed questionnaire, by sample enumeration, by interviews, or by other appropriate means (7 U.S.C. 411a, 951).

330. INFORMATION NOT TO BE RELEASED; SPECULATION; FALSE STATISTICS.

a. *Withholding information.*—The contents and every part of the contents of each and every report specified in paragraph 328a, and the information and every part of the information utilized in the preparation of such reports, shall be withheld from publication until the day and hour provided for the issuance of the reports in the schedule approved by the Secretary of Agriculture and amendments thereto.

b. *Access to information.*—No member of the Board or other persons engaged in the preparation of information for reports, shall, before the release of any Board report provided for herein, willfully impart or permit access to any information contained therein or any part thereof, directly or indirectly, to any person not entitled under the law and rules of the Department to receive the same. The Chairman may under this regulation notify officers in charge of field offices, in advance of publication, of changes made by the Board from recommendations submitted by such officers for nonspeculative items as defined in paragraph 331a(2).

c. *Statutory provisions.*

(1) "Whoever, being an officer, employee or person acting for or on behalf of the United States or any department or agency thereof, and having by virtue of his office, employment or position, become possessed of information which might influence or affect the market value of any product of the soil grown within the United States, which information is by law or by the rules of such department or agency required to be withheld from publication until a fixed time, willfully imparts, directly or indirectly, such information, or any part thereof, to any person not entitled under the law or the rules of the department or agency to receive the same; or, before such information is made public through

regular official channels, directly or indirectly speculates in any such product by buying or selling the same in any quantity, shall be fined not more than $10,000 or imprisoned not more than ten years, or both."

"No person shall be deemed guilty of a violation of any such rules, unless prior to such alleged violation he shall have had actual knowledge thereof." (June 25, 1948, ch. 645, sec. 1, 62 Stat. 790, 18 U.S.C. 1902.)

(2) "Whoever, being an officer or employee of the United States or any of its agencies, whose duties require the compilation or report of statistics or information relating to the products of the soil, knowingly compiles for issuance, or issues, any false statistics or information as a report of the United States or any of its agencies, shall be fined not more than $5,000 or imprisoned not more than 5 years, or both." (June 25, 1948, ch. 645, sec. 1, 62 Stat. 795, 18 U.S.C. 2072.)

331. SPECULATIVE AND NONSPECULATIVE DATA. a. *Definition.*—Data used by the Board in the preparation of the Monthly Crop Report and the Cotton Report shall be classified as follows:

(1) *Speculative data.*—Speculative data are defined to be data relating to corn, wheat, oats, cotton, soybeans, or sweet oranges, the assembling and collating of which would make it possible for any member, members, or assistants of the Board approximately to anticipate the Board's forthcoming report for the United States on the condition, yield, probable production, or farm stocks of designated commodities, or the acreage or ginnings of cotton. These data shall be deemed to be speculative for:

(a) *Corn* in Illinois, Indiana, Iowa, Minnesota, Missouri, Nebraska, and Ohio.

(b) *Winter wheat* in Illinois, Indiana, Kansas, Missouri, Nebraska, Ohio, Oklahoma, and Texas.

(c) *Spring wheat* in Minnesota, Montana, North Dakota, and South Dakota.

(d) *Oats* in Illinois, Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin.

(e) *Cotton* in Arkansas, Louisiana, Mississippi, and Texas.

(f) *Soybeans* in Arkansas, Illinois, Indiana, Iowa, Mississippi, Missouri, Minnesota, and Ohio.

(g) *Sweet oranges* in California and Florida.

(2) *Nonspeculative data.* — Nonspeculative data are defined to be any statistical data other than the speculative data defined in paragraph (1) above.

b. *Transmission.*

(1) *Field procedure.*—Summaries of speculative data collected in the field offices, together with recommendations of the officer in charge of each such office, shall be transmitted by mail or telegraph to the Secretary of Agriculture. When transmitted by mail, the summaries and recommendations shall be forwarded in a sealed envelope marked "Special A." When transmitted by telegraph, the summary and recommendations shall be forwarded in a secret code provided by the Secretary of the Board. Nonspeculative data may at all times be forwarded directly to the Secretary of the Board by the officers in charge of the field offices.

(2) *Departmental procedure.* — Immediately upon its receipt in the Department Telegraph Office, each telegram containing speculative crop report data shall be placed in a sealed envelope marked "Special A" in the Department Telegraph Office and delivered by special messenger to the Office of the Secretary of Agriculture.

c. *Custody of "Special A" envelopes.*—All "Special A" envelopes containing speculative crop report data received in the Office of the Secretary of Agriculture shall, immediately upon receipt and without breaking the seals thereof, be placed in the locked box provided for that purpose in the Office of the Secretary of Agriculture.

d. *Opening of "Special A" envelopes.*—Immediately preceding the convening of the Board on the day a report is to be published, the locked box in the Office of the Secretary of Agriculture containing the "Special A" envelopes shall be opened and the envelopes removed in the presence of a designated representative of the Secretary of Agriculture, the Chairman, Secretary, and one other member of the Board, and a special guard provided by the General Services Administration. The Chairman, Secretary, and other member of the Board, accompanied by the guard, shall then proceed directly to the Board rooms.

332. BOARD ROOMS. a. *Definition.* — The Board rooms shall consist of the Board room proper and all other rooms occupied during the

locked-in session of the Board by clerks, stenographers, and others engaged in assisting the Board in the preparation of the report.

b. *Safeguards against communication of information.*—Previous to the arrival of the Board representatives and guard with the sealed "Special A" envelopes, the Secretary of the Board shall have caused all windows in the Board rooms to be sealed in such manner as to prevent communication between persons within the Board rooms and persons outside. Also, previous to the arrival, all telephones in the Board rooms and connected with the central Department telephone switchboard shall be disconnected at the central switchboard, and any other means of communication from the Board rooms shall be similarly disconnected. Immediately after the entrance of the Board representatives into the Board rooms, with the sealed "Special A" envelopes, the guard shall lock all doors leading from the Board rooms, and remain on watch until the report is released. While on watch, the guard shall not permit any communication between persons within the Board rooms and persons outside except as provided below. The guard shall unlock the door only to permit:

(1) The entrance of:

(a) The Secretary of Agriculture.

(b) The Administrator of the Service.

(c) Officials of the Bureau of the Census who cooperate in issuing the Joint Cotton Ginning and Production Report.

(d) Employees of the Service and other persons whose presence is required in the preparation of the report and who have written permission from the Chairman.

(e) Other officials and employees of the Department having written authority from the Secretary of Agriculture, or from the Administrator of the Statistical Reporting Service.

(2) The delivery to the Board rooms of mail, telegrams, written communications, or supplies for use of the Board.

(3) Notification by the Chairman to the guard of delay in completion of a Board report (see subparagraph 333d) or by the Chairman or the Secretary of the Board to convey emergency instructions essential to completion of a report.

(4) The departure of:

(a) The Secretary of Agriculture, the Chairman, and such other persons as may be designated at the time by the Chairman, for the purpose of proceeding, under guard, to the room provided for the release of the report.

(b) Any person in the case of extreme emergency, in which event a member of the guard shall accompany and remain with such person until the release of the report.

(c) All persons in case of fire or other serious emergency.

333. Approval and Release of Reports.

a. *Approval.* — Upon the completion of any Board reports specified in subparagraph 328a of these regulations, a copy must be signed by the Chairman, Secretary, and each member of the Board, and approved in writing by the Secretary of Agriculture before it is released. The Chairman, accompanied by a member of the guard and not less than two other persons, shall take copies of the approved report from the Board rooms to the release room before the time specified for the publication and release of the report.

b. *Release officer.*—A designated representative of the Secretary of Agriculture shall act as release officer and shall provide in the release room suitable telegraph and telephone facilities for all persons desiring such facilities for the transmission of the report upon its official release.

c. *Procedure.*—Upon the arrival in the Board release room of the Chairman and persons accompanying him, the release officer shall cause all persons other than the Chairman to remain within a prescribed area until the release of the report, the limits of which area shall be not less than 6 feet from the telephones, telegraph instruments, and tables or shelves provided for distribution of copies of the report. The Chairman then shall place copies of the report, face down, beside each instrument, and additional copies, face down, upon the tables or shelves provided for that purpose. At the exact time provided for the official issuance of each report, the release officer shall inform those present that the report is released to the public and permit access to the copies of the report. The release officer then shall notify the guard at the door of the Board rooms that the report has been released and the guard thereupon shall unlock the doors of the Board rooms.

d. *Delay in releasing reports.*—In the event that the report should not be completed and approved for issuance at the designated time, the Chairman, within 10 minutes of the time designated for the release of the report, shall notify the guard of the time when the report will be ready for release. The guard immediately shall notify the release officer, who, in turn, shall notify all persons who are present in the release room for the purpose of receiving the report. In order that telephone communication with the Board rooms may not be reestablished before the crop report is completed and released, the release officer also shall notify the employee in charge of the central Department telephone switchboard of the delay.

334. Acnowledgement of Regulation.—The Deputy Administrator of the Statistical Reporting Service shall cause to be delivered, or exhibited, a copy of this regulation to each employee of the Service or other person having access to crop report data in advance of publication. The Deputy Administrator or an authorized representative shall obtain from each such person a certification which shall be an acknowledgement that such person has read this regulation and will be governed by it.

Calendar of Crop, Livestock, and Price Reports

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Crop Production (includes Annual Summary on Small Grains in December)	●	●	●	●	●	●	●	●	●	●	●	●
Prospective Plantings	●		●									
Annual Crop Summary	●											
Winter Wheat and Rye Plantings												●
Crop Values	●											
Other field and seed crops												
Seed Crops—Annual Summary					●							
Field Crops Disposition—Annual Summary					●							
Grains Stocks in All Positions	●			●			●			●		
Naval Stores	●	●	●	●	●	●	●	●	●	●	●	●
Peanut Stocks and Processing	●	●	●	●	●	●	●	●	●	●	●	●
Popcorn	●						●					
Potatoes, and Sweet potatoes—Annual Summary, including Potato Sales, and U.S. Utilization of Crop								●				
Potato Stocks	●	●	●	●								●
Rice Stocks	●			●				●		●		
Seed Crops, Forecasts and Other Reports	●		●			●	●	●, ●		●, ●		
								●, ●				
								●				
Soybean Stocks in All Positions									●			
Stocks of Hops			●						●			
Fruits and Nuts												
Apples—Production by Varieties	●							●				
Fruits, citrus—Annual Summary										●		
Fruits, noncitrus, Annual Summary	●						●					
Cranberries—Indicated Production 1:00 P.M. Release Time								●				
Cherry Report						●				●		
Vegetables												
Onion Stocks in Storage	●					●						
Vegetables—Fresh Market	●		●	●	●	●	●	●	●	●	●	●
Vegetables—Processing			●			●	●	●	●		●	●
Cucumbers for Pickles, Stocks											●	
Celery Report (Fla., Calif., Ohio, N.Y., and Mich.)	●	●	●	●	●	●	●	●	●	●	●	●

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Milk and Dairy Products												
Milk Production	●	●	●	●	●	●	●	●	●	●	●	●
Milk—Production, Disposition, and Income, by States				●								
Production of Manufactured Dairy Products						●						
Dairy products: Production of butter, cheese, frozen products, evaporated, condensed, dry milk and prices	●	●	●	●	●	●	●	●	●	●	●	●
Weekly American Cheese Production—Released at Madison, Wis.	Every Wednesday of the year											
Weekly Creamery Butter Production—Released at Madison, Wis.	Every Tuesday of the year											
Livestock and Livestock Products												
Cattle		●					●					
Sheep and Goats	●											
Meat Animals—Disposition and Income				●								
Livestock Slaughter and Meat Production	●	●	●	●	●	●	●	●	●	●	●	●
Annual Summary				●								
Cattle on Feed	●	●	●	●	●	●	●	●	●	●	●	●
Hogs and Pigs			●			●			●			●
Sheep on Feed	●		●								●	
Wool and Mohair Production and Value				●								
Lamb Crop and Wool Production							●					
Wheat pasture (in Crop Production)										●	●	●
Honey reports	●								●			
Mink, number pelted, females bred					●							
Poultry and eggs												
Chickens and Eggs and Commercial Broilers, Disposition and Income				●								
Commercial Broilers Produced and Broiler Chicks Placed in 21 States			●									
Egg Products—Liquid, Frozen, Solids, Production	●	●	●	●, ●	●	●	●	●	●	●	●	●
Eggs, Chickens, and Turkeys	●	●	●	●	●	●	●	●	●	●	●	●
Layers, and Egg Production		●										
Hatchery Production			●									
Poultry—Slaughter and Processing	●	●	●	●	●	●	●	●	●	●	●	●
Chicken Inventory												
Eggs, Chickens and Turkeys	●											
Turkeys	●		●					●	●			

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Poultry and eggs (continued)												
Weekly Turkey Hatchery Report—released in 9 States concerned...	Every Thursday of the year											
Weekly Broiler Hatchery Report—released in 21 States concerned..	Every Widnesday of the year											
Other reports												
Agricultural Prices	●	●	●	●	●	●	●	●	●	●	●	●
Prices Received by Farmers for Manufacturing-Grade Milk in Minnesota and Wisconsin							●					
Cold Storage	●	●	●	●	●	●	●	●	●	●	●	●
Commercial Fertilizers monthly	●	●	●	●	●	●	●	●	●	●	●	●
Flowers and Foliage Plants, 22 States			●									
Farm Labor	●	●			●			●			●	
Farm Numbers and Land in Farms	●											●
Mushrooms								●				

Actual titles are given unless several reports with different titles but similar content are released during the month or year, in which case reports are grouped under one heading. All reports released at 3:00 pm unless otherwise noted.

Questionnaire Design

Questionnaire design, like survey and estimating procedures, changed in the 1960's to keep pace with a more specialized agriculture. At one time, because most farms were general in type, it was enough to pose a broad-based series of questions relating to livestock (Exhibit 1) or crops (Exhibit 2) and send the survey forms to a wide array of crop reporters. Their responses provided adequate data for statisticians to make estimates.

Specialization in farming and ranching altered this approach to data collection and prompted development of more sophisticated surveys and questionnaires.

Most livestock and poultry surveys in use today are targeted for a specific species. Exhibit 3 is a cattle questionnaire; there are similar ones for hogs, sheep, chickens, turkeys, and dairying.

Crop questionnaires for mail surveys no longer ask for acreage data for 2 years (Exhibit 4). Greater use of the computer, allowing more efficient matching of questionnaires between surveys, and emphasis on planted acreage rather than harvested acreage in June surveys, has allowed questionnaire designers to shift to asking for current acreage data only. This has eliminated the memory bias that occurred when respondents were asked to recall the previous year's acreage data (Exhibit 2).

Questionnaires used for interview surveys are highly detailed (Exhibit 5). For example, the June enumerative survey requests data about crop acreages for specific fields within individual farm units. Other questions obtain data about irrigation, idle cropland, and number of crops harvested from a single field.

The most recent livestock and crop questionnaires also reflect SRS efforts to specifically identify the land operated by the respondent (Exhibit 6). The details enable the Service to identify and eliminate the duplication of names and land operations that occur between the list and area frames in multiple-frame sampling. This prevents double counting of data which would distort the estimates.

Questionnaires used by SRS are prepared by experienced Washington, D.C., survey statisticians and tested to determine effectiveness. Additionally, all survey forms must be approved by the Office of Management and Budget to ensure that information is obtained with a minimum burden on respondents, as economically as practical, and without unnecessary duplication.

Exhibit 1

C.E. 31-65

LIVESTOCK SURVEY, DEC. 1, 1966

8

UNITED STATES DEPARTMENT OF AGRICULTURE
STATISTICAL REPORTING SERVICE

Name . . . . . .

Post office . . . . . R. . . . . (Box)

County . . . . . State . . . . . ZIP Code . . . . .

REPORT FOR THE FARM(S) OR RANCH(ES) YOU OPERATE	Number
CATTLE AND CALVES	
1. **COWS** and **HEIFERS, two years old** and **over, kept for milk.** (Include all milk cows whether now in milk or dry and all 2-year-old heifers which will be milked when fresh)	
2. **HEIFERS, one year old** and **under two, now being raised for milk cows**	
3. **COWS** and **HEIFERS, two years old** and **over, not kept for milk.** (Include beef cows and 2-year-old beef heifers.) **Do not** include any cows and heifers reported under Question 1)	
4. **HEIFERS, one year old** and **under two, now being raised for beef cows or for beef.** (**Do not** include any heifers being raised for milk cows reported under Question 2)	
5. **STEERS, one year old** and **over**	
6. **BULLS, one year old** and **over**	
7. **1966 HEIFER CALVES** on hand **NOW.** (**Do not** include any animals reported under Question 2 or 4)	
8. **1966 BULL CALVES** and **STEER CALVES** on hand **NOW**	
9. **TOTAL CATTLE AND CALVES OF ALL AGES ON HAND NOW.** (Sum of items 1 to 8, inclusive)	
10. How many of the **above** cattle and calves are **now being fattened** on grain or concentrated feed for **slaughter** market?	
11. **COWS MILKED** yesterday	
12. **ALL MILK COWS** on hand (both dry and in milk). (**Do not** include heifers not yet freshened)	
13. Total production of **MILK** yesterday (Report only one day's production). Report in either **Pounds** or **Gallons**	
	Number
14. **CALVES BORN** in 1966. (Include calves on hand, calves sold or died and calves to be born in December. **Do not include calves bought**)	
15. Number that **DIED** since January 1, 1966, from disease, accidents, exposure or predators — **Cattle** / **Calves**	
16. Number **butchered** and **to be butchered** during 1966. (**Do not** include those custom butchered for you at a locker or other slaughter plant) — **Cattle** / **Calves**	
	Pounds
17. Total **live weight** of animals butchered and to be butchered during 1966 — **Cattle** / **Calves**	
	Number
CHICKENS	
18. Number of **EGGS** produced by your flock yesterday	
19. Number of **HENS** and **PULLETS of laying age** in your flock yesterday?	
a. Of the hens and pullets (Question 19), how many are one year old and over?	
20. **PULLETS NOT YET OF LAYING AGE but 3 months old and over on hand** yesterday	
21. **PULLET CHICKS** and **PULLETS under 3 months old** on hand yesterday (exclude broilers)	
22. **Other chickens** on hand yesterday (exclude broilers but include male breeding stock and male chicks)	
23. **Total Chickens** on hand yesterday (Sum of items 19, 20, 21, and 22)	

(See other side for report on Hogs and Sheep and Lambs)

POSTAGE AND FEES PAID
U.S. DEPT. OF AGRICULTURE

55 Budget Bureau No. 40-R134.9
Approval expires Oct. 31, 1967

Please make necessary corrections in name and address.

REPORT FOR THE FARM(S) OR RANCH(ES) YOU OPERATE	Number
SHEEP AND LAMBS	
24. Total **STOCK SHEEP AND LAMBS** on hand **NOW**	
HOGS AND PIGS	
25. **HOGS** and **PIGS of all ages** (include sows, gilts, and boars for breeding and all other hogs and pigs)	

26. Of the **HOGS** and **PIGS** (item 25) how many are in each of the following weight groups

	Used and to be used for breeding	Other hogs and pigs
	Number	Number
Under 60 lbs.		
60–119 lbs.		
120–179 lbs.		
180–219 lbs.		
220 lbs. & over		
Totals		

FARROWINGS

27. Number of **SOWS** and **GILTS that farrowed** (gave birth to pigs) during the **last six months, June 1** through **November 30, 1966**

28. Number of **PIGS SAVED** (**pigs living December 1, or sold before December 1**) from all litters farrowed during the **last six months, June 1** through **November 30, 1966**

29. Of the **SOWS** and **GILTS** that farrowed during the **last six months** (Question 27), how many farrowed in each of the following months?

June	
July	
Aug.	
Sept.	
Oct.	
Nov.	

30. Number of **SOWS** and **GILTS** that **have been bred** and **will be bred to farrow** from **December 1, 1966** through **May 31, 1967**

DEATH LOSS AND FARM BUTCHERING ON THIS FARM OR RANCH

31. **HOGS** and **PIGS** died in 1966

32. **HOGS** and **PIGS BUTCHERED** and **to be butchered** during 1966. (**Do not** include those custom butchered for you at a locker or other slaughter plant) — **Pounds**

33. Total **live weight** of the Hogs and Pigs butchered and to be butchered during 1966 (item 32 above)

34. Total pounds **LARD** rendered and to be rendered from **HOGS** and **PIGS** butchered — **Acres**

35. **Acres of ALL LAND in This Farm or Ranch You Operate** (Include land rented from others)

(See other side for report on Cattle and Poultry)

8 U.S. GOVERNMENT PRINTING OFFICE 1965—O-219-310

Exhibit 1.—A general livestock questionnaire in use in the mid-1960's.

Exhibit 2

C.E. 2-9744 "I" **JUNE 1967 ACREAGE SURVEY** North Dakota

REPORT FOR THE FARM OR RANCH YOU ARE OPERATING

CROP	Acres for harvest this year (1967)	Acres harvested last year (1966)
1. **Corn** for grain		
2. **Corn** for silage, hogging, pasture, or fodder		
3. **Durum wheat** for grain		
4. **Other spring wheat** for grain		
5. **Winter wheat** for grain		
6. **Oats** for grain		
7. **Barley** for grain		
8. **Rye** for grain		
9. **Flax**		
10. **Sorghums** for all purposes (exclude millet and sorghum x Sudan crosses)		
11. **Sugar beets** for sugar		
12. **Safflower**		
13. **Potatoes**		
14. **Sunflower**		
15. **Dry field peas**		
16. **Soybeans** for all purposes		
17. **Alfalfa and alfalfa mixtures** for hay		
18. **Grains for hay** (wheat, oats, barley, rye, etc.)		
19. **All other tame hay** (millet, Sudan, sorghum x Sudan crosses, Brome, sweetclover, crested wheatgrass, etc., for hay, but **not** soybeans for hay)		
20. **Wild, marsh, and prairie grasses** for hay		
21. Other crops **(not listed above)**		
	Acres in 1967	**Acres in 1966**
22. Land used for **pasture** only		
23. **Other cropland idle** and in **summer fallow** (**not** used for crops, pasture, or Conservation Reserve)		
24. **All other land not reported above** (Include Wheat, Conservation Reserve, Feed Grain diversion, etc.)		
25. **ACRES OF ALL LAND IN THIS FARM OR RANCH** (Include land rented from others)		

[Over for name, address, and county] 16—78948-1

Exhibit 2.—A general crop questionnaire requesting current year and previous year (historical) acreage for harvest, in use in the mid-1960's.

Exhibit 3

CATTLE AND CALVES

Please report below all **CATTLE** *and* **CALVES** *on the land you operate, regardless of ownership (include those now on feed). Also include those owned by this farm or ranch that are now on public grazing land.*

How many are:

3. **BEEF COWS?** *(Include heifers that have calved)*..... 351

4. **MILK COWS,** whether dry or in milk? *(Include milk heifers that have calved)*..... 352

5. **BULLS** weighing 500 pounds or more? 353

6. **HEIFERS** weighing 500 pounds or more: .....
   a. For **BEEF COW** replacement? *(exclude heifers that have calved)*..... 354
   b. For **MILK COW** replacement? *(exclude heifers that have calved)*..... 355
   c. **OTHER HEIFERS** weighing 500 pounds or more? *(exclude heifers that have calved)*..... 356

7. **STEERS** weighing 500 pounds or more?..... 357

8. **HEIFER, STEER** and **BULL CALVES** weighing less than 500 pounds?..... 358

9. **Add all entries above** (questions 3 through 8) This should be the **TOTAL** number of **CATTLE** and **CALVES** now on the land you operate 350

a. Are any of these (question 9) cattle and calves located in another State? ☐ YES ☐ NO

If yes, what State(s) are these cattle and calves located? _____ _____

CATTLE AND CALVES ON FEED

10. How many of the above (question 9) **CATTLE** and **CALVES** are now **BEING FINISHED** on **GRAIN** or **CONCENTRATED FEED** for **SLAUGHTER MARKET?**..... 383

11. Of the above (question 10) **CATTLE BEING FINISHED,** how many are:
    a. **HEIFERS** weighing 500 pounds or more? 384
    b. **STEERS** weighing 500 pounds or more? 385
    c. **HEIFERS** and **STEERS** weighing less than 500 pounds?..... 386

CALF CROP

13. How many **CALVES were BORN in 1973** on the land you operate? (Include all those still on the farm, sold, slaughtered, or died. Exclude calves bought.)..... 369

Exhibit 3.—Part of a 1974 questionnaire designed specifically for obtaining cattle information.

Exhibit 4

C.E. 02-9744
"K"
North Dakota

UNITED STATES DEPARTMENT OF AGRICULTURE
Statistical Reporting Service

23 D. M. B. Number 40-R0100
Approval Expires 4-30-75

JUNE 1974 ACREAGE SURVEY

Dear Reporter:

The information asked for in this survey is used in preparing estimates of crop acreages for 1974. Your report will help in representing your locality.

Please return promptly in the enclosed envelope which does not require a stamp. If exact acreage is not known, please give your best estimate. Your report will be kept confidential.

Respectfully,

Bruce M. Graham
Chairman, Crop Reporting Board

Please make corrections in name, address, and Zip Code, if necessary.

REPORT FOR THE FARM OR RANCH YOU ARE OPERATING

CROP	Acres planted last fall and this spring	Acres for harvest as grain in 1974
1. Winter Wheat	680	685
2. Rye	470	473
		Acres planted or to be planted in 1974
3. Corn for all purposes		130
4. Soybeans for all purposes		625
5. Durum Wheat		775
6. Spring Wheat (other than Durum)		740
7. Oats for all purposes		385
8. Barley		001
9. Flax		270
10. Millet for all purposes		869
11. Potatoes		435
12. Sugarbeets		649
13. Sunflowers: Oil varieties		876
Non-oil varieties		877
14. Other spring planted crops _____ (name crop)		897
		Acres to be cut for hay in 1974
15. Alfalfa and alfalfa mixtures		286
16. All other hay (include wild marsh, and prairie, grains, bromegrass, timothy, millet, red clover, sweetclover, Sudan and sorghum X Sudan crosses to be cut for hay)		316
		Acres in 1974
17. Pasture and rangeland		961
18. Land in summer fallow		965
19. All other land (idle, diverted acreage, etc.)		960
20. ACRES OF ALL LAND IN THIS FARM OR RANCH (include land rented from others)		995

Please check here ☐ if you would like to receive a report of the results of this survey

OFFICE USE 998

Reported by _____ County _____ (In which farm is located)

State _____ Zip Code _____

Exhibit 4.—A 1974 crop acreage questionnaire primarily requesting acreage planted for the current year.

Exhibit 5

SECTION A – ACREAGES OF FIELDS AND CROPS IN TRACT

A – 2 (Blue)

	FIELD NUMBER	1	2	3	4
1.	TOTAL ACRES IN FIELD				
2.	CROP OR LAND USE (Specify)				
3a.	TWO CROPS HARVESTED FROM THIS FIELD	NO ☐ YES ____	NO ☐ YES ____	NO ☐ YES ____	NO ☐ YES ____
3b.	ACRES LEFT TO BE PLANTED?	61_	61_	61_	61_
4.	ACRES IRRIGATED AND TO BE IRRIGATED?	6__	6__	6__	6__
5.	FARMSTEAD, ROADS, DITCHES, WOODS, WASTE, ETC.				
6.	PASTURE – Permanent – Not in crop rotation	842	842	842	842
7.	PASTURE – Cropland – Used only for pasture	845	845	845	845
8.	SPRING WHEAT OTHER THAN DURUM – Planted	550	550	550	550
9.	DURUM WHEAT – Planted	551	551	551	551
10.	WINTER WHEAT – Planted	540	540	540	540
11.	WINTER WHEAT – For Grain	541	541	541	541
12.	RYE – Planted and to be planted	547	547	547	547
13.	RYE – For Grain	548	548	548	548
14.	OATS – Planted and to be planted	533	533	533	533
15.	OATS – For Grain	534	534	534	534
16.	BARLEY – Planted and to be planted	535	535	535	535
17.	BARLEY – For Grain	536	536	536	536
18.	CORN – Planted and to be planted	530	530	530	530
19.	CORN – For Grain	531	531	531	531
20.	SORGHUM (Excl. crosses) – Planted and to be planted	570	570	570	570
21.	SORGHUM (Excl. crosses) – For Grain	571	571	571	571
22.	OTHER USES OF GRAINS PLANTED – Acres abandoned, cut for hay, etc. – Use				
	Acres				
23.	HAY – Cut and to be cut – ALFALFA AND ALFALFA MIXTURES	653	653	653	653
	HAY – Cut and to be cut – OTHER HAY – Kind				
24.	HAY – Cut and to be cut – Acres	65_	65_	65_	65_
25.	SOYBEANS – Planted and to be planted	600	600	600	600
32.	DRY EDIBLE BEANS – Planted and to be planted	607	607	607	607
33.	SUGAR BEETS – Planted and to be planted	691	691	691	691
34.	FLAXSEED – Planted and to be planted	693	693	693	693
35.	IRISH POTATOES – Planted and to be planted	552	552	552	552
36.	OTHER CROPS – Name				
	Acres planted or in use				
37.	SUMMER FALLOWED during 1974	847	847	847	847
38.	CROPS PLANTED FOR SOIL IMPROVEMENT ONLY – No other use during 1974	856	856	856	856
39.	IDLE CROPLAND – Idle all during 1974	857	857	857	857

Exhibit 5.—Portion of a June enumerative survey questionnaire with answer cells for recording planted acreages of individual fields, with additional data.

Exhibit 6

OPERATION DESCRIPTION OF LAND

18. Do you operate any **agricultural land** in a joint arrangement with another person? *Exclude landlord – tenant arrangements.* *(Check one)*

☐ YES ☐ NO – *turn to page 4.*

Operation information as previously reported has been entered below. Is this description correct for the land you **now** operate?

☐ NO ——→ *Please make corrections and continue.*

☐ YES ——→ *Skip to question 21.*

19. Who are the persons in the joint land arrangement with you?

a. Name _____

b. Address _____ Zip _____

c. Is he a: ☐ Partner ☐ Corporate member ☐ Manager ☐ Other _____

d. Partnership or Corporation Name: _____

a. Name _____

b. Address _____ Zip _____

c. Is he a: ☐ Partner ☐ Corporate member ☐ Manager ☐ Other _____

d. Partnership or Corporation Name: _____

20. How many acres are in this joint **land** arrangement? ..... Acres ☐

21. How many:...

a. Acres of joint land were included in land you now operate? ..... Acres ☐

b. Cattle and Calves are now on the joint land? ..... Number ☐

c. Cattle and Calves now on joint land were included in question 9? ..... Number ☐

Exhibit 6.—Modern questionnaires obtain information about agricultural land operated by the respondent which enables SRS statisticians to identify and eliminate duplication on survey lists.

State Statistical Offices

Office Title	City	State
Alabama Crop and Livestock Reporting Service	Montgomery	Alabama
Alaska Crop and Livestock Reporting Service	Palmer	Alaska
Arizona Crop and Livestock Reporting Service	Phoenix	Arizona
Arkansas Crop Reporting Service	Little Rock	Arkansas
California Crop and Livestock Reporting Service	Sacramento	California
Colorado Crop and Livestock Reporting Service	Denver	Colorado
Florida Crop and Livestock Reporting Service	Orlando	Florida
Georgia Crop Reporting Service	Athens	Georgia
Hawaii Crop and Livestock Reporting Service	Honolulu	Hawaii
Idaho Crop and Livestock Reporting Service	Boise	Idaho
Illinois Cooperative Crop Reporting Service	Springfield	Illinois
Indiana Crop and Livestock Reporting Service	West Lafayette	Indiana
Iowa Crop and Livestock Reporting Service	Des Moines	Iowa
Kansas Crop and Livestock Reporting Service	Topeka	Kansas
Kentucky Crop and Livestock Reporting Service	Louisville	Kentucky
Louisiana Crop and Livestock Reporting Service	Alexandria	Louisiana
Maryland-Delaware Crop Reporting Service	College Park	Maryland
New England Crop Reporting Service*	Boston	Massachusetts
Michigan Crop Reporting Service	Lansing	Michigan
Minnesota Crop and Livestock Reporting Service	St. Paul	Minnesota
Mississippi Crop and Livestock Reporting Service	Jackson	Mississippi
Missouri Crop and Livestock Reporting Service	Columbia	Missouri
Montana Crop and Livestock Reporting Service	Helena	Montana
State-Federal Division of Agricultural Statistics	Lincoln	Nebraska
Nevada Crop and Livestock Reporting Service	Reno	Nevada
New Jersey Crop Reporting Service	Trenton	New Jersey
New Mexico Crop and Livestock Reporting Service	Las Cruces	New Mexico
New York Crop Reporting Service	Albany	New York
Federal-State Crop Reporting Service	Raleigh	North Carolina
North Dakota Crop and Livestock Reporting Service	Fargo	North Dakota
Ohio Crop Reporting Service	Columbus	Ohio
Oklahoma Crop and Livestock Reporting Service	Oklahoma City	Oklahoma
Oregon Crop and Livestock Reporting Service	Portland	Oregon
Pennsylvania Crop Reporting Service	Harrisburg	Pennsylvania
South Carolina Crop and Livestock Reporting Service	Columbia	South Carolina
South Dakota Crop and Livestock Reporting Service	Sioux Falls	South Dakota
Tennessee Crop Reporting Service	Nashville	Tennessee
Texas Crop and Livestock Reporting Service	Austin	Texas
Utah Crop and Livestock Reporting Service	Salt Lake City	Utah
Virginia Crop Reporting Service	Richmond	Virginia
Washington Crop and Livestock Reporting Service	Seattle	Washington
West Virginia Crop and Livestock Reporting Service	Charleston	West Virginia
Wisconsin Statistical Reporting Service	Madison	Wisconsin
Wyoming Crop and Livestock Reporting Service	Cheyenne	Wyoming

* Includes: Connecticut, Maine, New Hampshire, Rhode Island, Vermont, and Massachusetts.